



## **UWL REPOSITORY**

**repository.uwl.ac.uk**

A Neglected issue in the History of Education and Training: Women Students of University College London 1870-1930

Stevenson, Julie (1996) A Neglected issue in the History of Education and Training: Women Students of University College London 1870-1930. Doctoral thesis, Thames Valley University.

<https://doi.org/10.36828/xvqy1528>

**This is the Published Version of the final output.**

**UWL repository link:** <https://repository.uwl.ac.uk/id/eprint/11528/>

**Alternative formats:** If you require this document in an alternative format, please contact: [open.research@uwl.ac.uk](mailto:open.research@uwl.ac.uk)

### **Copyright:**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

**Take down policy:** If you believe that this document breaches copyright, please contact us at [open.research@uwl.ac.uk](mailto:open.research@uwl.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.

**A NEGLECTED ISSUE IN THE HISTORY OF  
EDUCATION AND TRAINING: WOMEN STUDENTS OF  
UNIVERSITY COLLEGE LONDON AND THE POLYTECHNIC  
AT REGENT STREET, c. 1870-1930**

**JULIE STEVENSON**

**A thesis submitted in fulfilment of the requirements of  
Thames Valley University, London,  
for the degree of Doctor of Philosophy.**

**February 1996**

## CONTENTS

List of Tables .....	p. i
List of Appendices .....	p. iv
Acknowledgements .....	p. v
Note to the Text .....	p. vi
Abstract .....	p. vii
Introduction .....	p. viii

### Chapter One:

Education, training and economic performance in late Victorian and Edwardian Britain .....	p. 1
--	------

### Chapter Two:

Women, society and education before the First World War .....	p. 27
---	-------

### Chapter Three:

Scientific education for women at University College London 1873-1913 .....	p. 57
---	-------

### Chapter Four:

Scientific and technical training for women at the polytechnic at Regent Street, 1888-1913 .....	p. 92
--	-------

### Chapter Five:

What next? The career prospects of women educated at U.C.L. and trained at the polytechnic before the First World War .....	p.132
---	-------

### Chapter Six:

The British economy, structural change and women's work, 1918-1930 .....	p.165
--	-------

## **Chapter Seven:**

Women, society and education, 1918-1930 . . . . . p.193

## **Chapter Eight:**

Scientific education for women at University College London 1918-1930 . . . . . p.223

## **Chapter Nine:**

Scientific and technical training for women at the polytechnic at  
Regent Street, 1918-1930 . . . . . p.269

## **Chapter Ten:**

A widening sphere of influence? The career prospects of women educated  
at U.C.L. and trained at the polytechnic between 1918 and 1930 . . . . . p.313

**Conclusion** . . . . . p.369

**Appendices** . . . . . p.379

**Bibliography** . . . . . p.410



## LIST OF TABLES

<b>Table 3.1</b>	Students of U.C.L., 1873-1913, Faculty of Arts, Science and Laws . . . . .	p. 63
<b>Table 3.2</b>	Students of U.C.L. by subject, 1910-1911 . . . . .	p. 69
<b>Table 3.3</b>	Courses offered at U.C.L. in the department of science, and their availability to women, 1879-1913 . . . . .	p. 72
<b>Table 3.4</b>	Students of science at U.C.L., 1900-1913 . . . . .	p. 74
<b>Table 3.5</b>	Graduates of U.C.L., 1880-1913, BA and BSc . . . . .	p. 77
<b>Table 3.6</b>	Students and graduates of U.C.L., 1881-1912 . . . . .	p. 82
<b>Table 4.1</b>	Polytechnic membership, 1905-1913 . . . . .	p. 97
<b>Table 4.2</b>	City and Guilds examination passes, 1895-1904 . . . . .	p.102
<b>Table 4.3</b>	Department of Science examination results, 1897-1911 . . . . .	p.112
<b>Table 4.4</b>	Total passes in City and Guilds and Department of Science examinations, ten year average . . . . .	p.112
<b>Table 4.5</b>	Department of Art examination results, 1900, 1905 and 1910 . . . . .	p.120
<b>Table 4.6</b>	Cost of selected polytechnic courses, 1888-1914, per quarter . . . . .	p.125
<b>Table 5.1</b>	Former students of Newnham College, Cambridge, who engaged in teaching as a profession, 1871-1893 . . . . .	p.135
<b>Table 5.2</b>	Occupations of polytechnic members, 1905-1913 . . . . .	p.153
<b>Table 5.3</b>	Polytechnic members apprenticed within their trades, 1905-1913 . . . . .	p.155
<b>Table 5.4</b>	Types of apprenticeship, and numbers of men and women participating in each, 1905-1913 . . . . .	p.156
<b>Table 6.1</b>	Proportion of men and women employed, based on the total potential labour force for each group, 1911-1931 . . . . .	p.176
<b>Table 6.2</b>	Female clerical workers, 1911-1931 . . . . .	p.182
<b>Table 7.1</b>	Full-time students at university in England and Wales as a percentage of total students, 1920-1934 . . . . .	p.197

<b>Table 8.1</b>	Students of U.C.L., 1918-1930 . . . . .	p.226
<b>Table 8.2</b>	U.C.L. composition fees, 1918-1930 . . . . .	p.231
<b>Table 8.3</b>	Entrance scholarships awarded by U.C.L., 1918-1930 . . . . .	p.232
<b>Table 8.4</b>	Students of science at U.C.L., 1918-1930 . . . . .	p.234
<b>Table 8.5</b>	Students of medical science at U.C.L., 1918-1930 . . . . .	p.236
<b>Table 8.6</b>	Students of engineering at U.C.L., 1918-1930 . . . . .	p.240
<b>Table 8.7</b>	Students of arts at U.C.L., 1918-1930 . . . . .	p.243
<b>Table 8.8</b>	Female percentage of total students in the schools of journalism, librarianship and architecture at U.C.L., 1919-1930 . . . . .	p.246
<b>Table 8.9</b>	Students of law at U.C.L., 1918-1930 . . . . .	p.251
<b>Table 8.10</b>	Graduates of U.C.L., 1918-1930 . . . . .	p.256
<b>Table 8.11</b>	Science graduates of U.C.L., 1918-1930 . . . . .	p.258
<b>Table 8.12</b>	Subjects leading to BA degrees, and aggregate number of women graduating in each subject, 1918-1930 . . . . .	p.260
<b>Table 8.13</b>	Students and graduates of U.C.L., 1918-1930 . . . . .	p.261
<b>Table 8.14</b>	Female students and female graduates of U.C.L., 1918-1930 . . . . .	p.263
<b>Table 9.1</b>	Polytechnic membership, 1918-1930 . . . . .	p.276
<b>Table 9.2</b>	City and Guilds examination results, 1918-1930 . . . . .	p.279
<b>Table 9.3</b>	Department of Commerce examination results, 1918-1930 . . . . .	p.283
<b>Table 9.4</b>	Bodies awarding qualifications in commerce, and women successful on each, 1919-1930 . . . . .	p.284
<b>Table 9.5</b>	Courses taken to obtain the stage three certificate of the Royal Society of Arts, 1918-1919 . . . . .	p.285
<b>Table 9.6</b>	Students of journalism, 1920-1924 . . . . .	p.286
<b>Table 9.7</b>	Polytechnic Institute examination results, 1918-1930 . . . . .	p.288
<b>Table 9.8</b>	Students of natural science, photography and tailoring, 1918-1930 . . . . .	p.289
<b>Table 9.9</b>	Students of languages, 1920-1928 . . . . .	p.293

<b>Table 9.10</b>	Students of mathematics, physics and chemistry, 1918-1930 . . . . .	p.299
<b>Table 9.11</b>	Higher National Certificate examination results, 1918-1930 . . . . .	p.301
<b>Table 9.12</b>	Examination results in remaining subject areas, 1918-1930 . . . . .	p.303
<b>Table 9.13</b>	Cost of selected polytechnic courses, 1918-1930. . . . .	p.308
<b>Table 10.1</b>	Post-graduate qualifications awarded to female science graduates of U.C.L from 1918. . . . .	p.323
<b>Table 10.2</b>	Higher degrees awarded by U.C.L., 1925-1935 . . . . .	p.325
<b>Table 10.3</b>	Higher science degrees awarded between 1925 and 1935 compared to science graduates of U.C.L from 1918 to 1930. . . . .	p.325
<b>Table 10.4</b>	Examination results of the University Teacher's Diploma, 1927-1933 . . . . .	p.327
<b>Table 10.5</b>	Occupations entered by female science graduates of U.C.L from 1918. . . . .	p.329
<b>Table 10.6</b>	Awards, fellowships and memberships obtained by female science graduates of U.C.L from 1918. . . . .	p.340
<b>Table 10.7</b>	Occupations of polytechnic members, 1918-1930. . . . .	p.346
<b>Table 10.8</b>	Occupations of students of journalism, 1920-1923 . . . . .	p.354
<b>Table 10.9</b>	Occupations of students of photography, 1919-1929 . . . . .	p.356
<b>Table 10.10</b>	Occupations of students of chemistry, 1920-1927 . . . . .	p.361
<b>Table 10.11</b>	Occupations of students of tailor's cutting, 1922-1929 . . . . .	p.363

## LIST OF APPENDICES

<b>Appendix A</b>	Female BSc graduates and breakdown of courses studied, 1885-1891 . . . . .	p.379
<b>Appendix B</b>	The later activities of U.C.L.'s female science graduates from 1880 . . . . .	p.383
<b>Appendix C</b>	The later activities of U.C.L.'s female science graduates from 1918 . . . . .	p.393

## ACKNOWLEDGEMENTS

There are many people to whom I am indebted for their advice, support and encouragement. It is not possible to thank everyone personally, so I take this opportunity to express my gratitude to anyone who has offered assistance and is not mentioned by name.

Particular thanks are due to both my supervisors, Professors John Armstrong and Pat Thane, who provided much encouragement, expertise and enthusiasm, support when it was needed most and have been a constant source of inspiration. During my many visits to the records office of University College London I received a warm, friendly welcome and valuable assistance with many enquiries. I therefore wish to thank Elizabeth Gibson, Carol Bowen and Jaimé Imbeah for their friendliness and efficiency and the endless supply of tea and coffee! Special thanks must go to Penny Pope, chief cataloguer at the University of Westminster, who in the absence of an archivist during my first year of research, helped me to locate documents and graciously sacrificed her office on a regular basis. Since then, Brenda Weeden has been appointed archivist, and in a short space of time has transformed the archive. I thoroughly enjoyed working with her, and am grateful for her help and enthusiasm.

This thesis would not have been possible without the perseverance of all those at Thames Valley University's Secretarial Services, and particularly the work of Kawaljit Ahluwalia who has drafted and re-drafted many versions and has presented the final document so professionally. Finally, a big thank you to Hugh for putting up with me for three long years, and especially for his support, patience and encouragement which were not always deserved, but which made the thesis less burdensome than might otherwise have been the case.

## NOTE TO THE TEXT

- i) All prices referred to in this text are in pre-decimal form, which existed until 1971.

The following is a summary of the value of each monetary unit, followed by a conversion into current prices.

One pence (1d) = 4 farthings (4x ¼d)

One shilling (1s) = 12 pence (12d)

One pound (£1) = 20 shillings (20s)

One guinea (1gn) = 21 shillings (21s)

1d = approximately 0.4 of a new penny

1s = 5 pence in new money

£1 = £1 in new money

1gn = £1.05 in new money

- (ii) It has not been possible to name some of the female students who fall within the scope of this thesis because of regulations regarding anonymity and confidentiality practiced by University College London and the University of Westminster. Such women have been referred to by numbers. Where a woman has been referred to by name, this is because details of her achievements have reached the public domain, and thus need not be considered confidential.

## ABSTRACT

This thesis investigates the participation of women in higher and further education in the period 1870-1930. It focuses specifically on women who studied scientific, technical and vocational subjects at two London based institutions; University College London (U.C.L.) and the polytechnic at Regent Street, aiming to determine the extent to which women were involved, both numerically and as a proportion of the total student body in each establishment. An emphasis is placed on women as science and technology students because little research has been carried out in this field, most histories of women who entered higher education outlining their affinity for the arts. Thus, this research aims to establish whether scientific and vocational subjects attracted many female students before and after the First World War. The thesis also investigates the activities of these women after they left education, and considers in particular whether they secured paid employment. This helps to assess their motivation for studying and the extent to which they used their qualifications for vocational reasons.

The findings indicate that women's participation at both U.C.L. and the polytechnic at Regent Street was significant, a feature of the history of education and training which is not always recognised, and that they were involved in a number of subject areas which had vocational applications. Although it is difficult to trace the lives of women after they left education, the research into the post-graduate activities of women who had been educated in the sciences at U.C.L. demonstrates that many of these women were committed to securing employment, much of it high profile, challenging and even pioneering. They do not appear to have studied at university out of amateur interest alone. This thesis thus makes a positive contribution to the history of women's education and training by indicating that at two London institutions women formed a significant and successful group who embarked upon a range of interesting careers after they left education.

## INTRODUCTION

When one reads histories of women in higher education, the impression is easily gained that because women struggled to gain entry to universities, faced discrimination once there, and at Oxford and Cambridge were not allowed degrees until after the First World War, those that did succeed in gaining entry and achieving qualifications were a pioneering minority.<sup>1</sup> Certainly, gaining a higher education was an uphill struggle for women which required much commitment, but in spite of this a significant number succeeded. This thesis demonstrates the achievements of women students of U.C.L. and thus begins to redress the balance of a number of accounts which have focused on the lack of progress made by women in higher education. At the polytechnic women also played an important role as students. However, so little has been written on women in the polytechnic sector, or indeed on the polytechnic movement in general, that it is difficult to say how surprising or otherwise these findings are. Most accounts of the history of technical training are notable by their lack of reference to women, which leads to an assumption that the sector was essentially male dominated. The following chapters will hopefully clarify this impression.

The history of scientific education and technical training is also tied in with the debate which surrounds the alleged 'decline' of the British economy from the 1870s up to the First World War, and then after a brief post-war boom, for the duration of the 1920s. Many explanations for Britain's poor performance have been provided,<sup>2</sup> one of which is that Britain neglected new methods of technical training which might have provided a boost to industry and allowed her to compete more effectively with new industrial powers such as Germany and the U.S.A. It has been argued that higher and further education establishments failed to provide enough people sufficiently trained for skilled industrial employment, and that businesses were reluctant to recruit such individuals.<sup>3</sup> Research into the post-graduate activities of women



who had been educated and trained at U.C.L. and the polytechnic contributes to this debate, by enabling an assessment of what careers, if any, were embarked upon by women who had relevant scientific and technical qualifications. Too often, accounts of technical training and employment ignore female achievements. This does not mean that women did not gain such training. The following case studies will emphasise that they did, but it may indicate that women rarely procured highly technical posts in industry after leaving education, and if this is the case, that there was a lack of incentive or opportunity for highly trained and educated women to make the most of their skills, in spite of a national deficiency of individuals qualified for technical employment.

The following chapters consider women's role in higher and further education at U.C.L. and the polytechnic, and their choices of career after leaving education in order to shed some light on these issues. The two institutions were chosen because they were each one of the first of their kind in London to be opened to women. U.C.L. first admitted women as undergraduates in 1878<sup>4</sup> and the polytechnic at Regent Street established a separate women's college in 1888 after Quintin Hogg became president in 1881, although it had admitted women for most of its history since 1838.<sup>5</sup> Both colleges also had well preserved records, which listed students by their full names. This made a quantification of male and female participation straightforward. Other institutions, for example Birkbeck, only recorded students by initial, which was a praiseworthy attempt at egalitarianism at the time, but rather frustrating from the point of this research! For a period during the 1920s, the polytechnic magazines began to use this approach, but fortunately an alternative source which documented students by their full names was located.

Educationally each institution performed a different function between 1870 and 1913. U.C.L. offered full-time degree courses, and the polytechnic, mainly part-time evening

technical classes. Thus, a comparison of the social status of the students who attended each and an assessment of the quality and nature of the education offered to women from different socio-economic backgrounds could be made. A 'case study' approach was chosen so that the characteristics of each institution could be studied in considerable detail, rather than a more superficial analysis of a number of institutions being offered. The aim of the thesis is not to 'rewrite' the history of women's higher and further education, because the data used is not broad enough to support firm generalisation, although hopefully it will encourage others to carry out similar research for different institutions. However, by presenting two examples where women formed a significant contingent, the notion that women were often marginalised within education and in particular in science subjects, can be reviewed.

The choice of timescale is designed to correspond with the onset of alleged economic depression in Britain in 1873, and also the opening of a number of universities and colleges to women during the 1870s and up to the First World War. Thus, the first five chapters of the thesis outline the role of education and training in Britain's economic performance before 1914, women's experiences in the field of education and training in Britain generally, and then at U.C.L. and the polytechnic more specifically, and in conclusion, women's uses of their education after graduation, the range of occupations which they entered and their motives for study. The second section begins with the resumption of peace in 1918 and covers the decade of the 1920s, with the aim of establishing whether educational opportunity had changed for women as a result of their increased participation in public life during the war, the growth of newer 'light' industries which often employed women in preference to men during the 1920s, and the gaining of partial franchise in 1918. The opening chapters consider the restructuring of British industry after the war and particularly the way in which this affected female employment prospects, the role of education and training and the position of women in education and society generally. The final three chapters deal specifically with

women's participation at U.C.L. and the polytechnic, and assess their post-graduate activities, occupations and qualifications. The 1920s have often been described as an era of 'missed opportunities' in educational advance.<sup>6</sup> The inclusion of these years within the scope of this thesis enables an assessment of whether this was the case with regard to women's involvement in higher and further education. The thesis opens with a brief outline of the performance of the British economy between 1870 and 1913 and debates the extent of economic 'failure' with specific reference to the role of education and training.

## NOTES TO INTRODUCTION

1. See for example: J Purvis (1991), p.116; J N Burstyn (1980), pp.139-40 and pp.161-4; R McWilliams-Tullberg (1975), especially chapters 5 and 6.
2. For details of this debate, see chapter one below. Useful texts are K Burgess (1988), especially pp. 254-5 and R C O Matthews, C H Feinstein and J C Odling-Smee (1982), introduction.
3. E E Williams (1896), especially chapters 7 and 8; M Sanderson (1972), p.9; P Alter (1988), pp. 271-2; A Albu (1982), pp. 68-9.
4. H H Bellot (1929), p. 372.
5. Polytechnic Magazine (1888), Vol. 12, No. 235, Jan 7th, p. 1, University of Westminster Archives.
6. For details of this argument, see chapter seven below. The main points however, can be gained from P Gordon, R Aldrich and D Dean (1991), pp. 59-60 and M Sanderson (1988), p. 43.

## **CHAPTER ONE: EDUCATION, TRAINING AND ECONOMIC PERFORMANCE IN LATE VICTORIAN AND EDWARDIAN BRITAIN**

### **A CASE OF ECONOMIC FAILURE?**

The performance of the late Victorian and Edwardian economy has provided a seemingly unending debate for economic historians and has generated considerable discussion and controversy. It is not necessary for the purposes of this thesis to enter into the intricacies of the debate. However, it is important to outline the main themes in brief in order that the nature and role of education in late nineteenth and early twentieth century Britain can be understood, and the position of women in the field of employment can be established.

It has commonly been argued that in 1873 there was a peak in the trade cycle which followed two decades of 'Mid-Victorian prosperity'<sup>1</sup> and was succeeded by four decades of economic slow-down. Arguments as to whether the economy had fallen into deep depression, was suffering from an inevitable lull, or responding to the onset of overseas competition for the first time have been voiced, revised and re-evaluated over a period of at least sixty years. Thus, the debate is lengthy and cannot fully be explored here. Disagreements have arisen largely from differing interpretations of British economic growth in the pre-First World War period. Keith Burgess has shown that definitions of growth vary in three important respects: Performance in relation to earlier periods; comparisons with developments taking place in other countries contemporaneously or any level of growth, irrespective of comparability with previous periods or other producers.<sup>2</sup> It seems generally to be accepted by most historians that the British economy was still 'growing' between 1873 and 1913, even though its rate of growth was slower than it had been in previous years, or than was being experienced in other industrialising nations. For example, between 1856 and 1873 Gross Domestic Product (G.D.P.) was expanding at a rate of 1.3 per cent per annum in Britain, whereas between

1873 and 1913 that rate had fallen to 0.9 per cent. In the latter period the German rate of growth was 1.5 per cent, and the American, 1.6 per cent.<sup>3</sup>

Crucially, both sets of data show that there is no case for depression or 'failure', because British growth rates remained positive. Thus, the British economy was still expanding in the period 1873-1913. However, it seems that some slowdown or 'retardation' occurred. This has become the focus of much discussion and disagreement, as historians have attempted to establish why the lull took place, and how it might have been prevented. One tenet of this debate is the view that Britain failed effectively to train and educate her workforce to the same standard as overseas nations, which allowed them a competitive advantage. This issue will be considered in full at a later point.

A further complication in the debate surrounding economic 'failure' is that there is no one accepted growth measurement. Different commentators have used G.D.P figures, investment statistics and figures showing the share of world trade held by different countries amongst others, and inevitably, all offer slightly different interpretations.<sup>4</sup> Crucially, the message from all these indicators is that British growth rates were lagging to a greater or lesser degree behind those of other industrialising nations, although Britain's actual share of, for example, world trade remained dominant through to 1913.<sup>5</sup> In spite of such disagreements, the core of the debate focuses on the causes of Britain's diminished economic position, with most recognising that the economy was not in total depression.

A number of explanations for Britain's relatively poor economic performance have been proposed, which should be outlined in brief to provide a context for understanding the role of education and training. A common theme is that Britain was disadvantaged by failing to adopt new techniques and technologies at the same rate as other countries, with notable

examples such as mechanical coal cutting which was pioneered in the USA but rarely used in Britain and the direct steel making process which was adopted by the Germans but under-utilised in Britain.<sup>6</sup> However, this argument has been contested on the grounds that Britain's long history of economic success was largely due to the availability of skilled labour. America, in contrast, had a shortage of skilled labour which made development of capital-intensive methods of production essential. Thus, it has been argued, that Britain's apparent reluctance to adopt mechanised processes was in fact a rational utilisation of the country's endowments.<sup>7</sup> In addition, many of the new technological developments such as mechanical coal cutting and the ring-spindle method of production in the cotton industry were not compatible with British coal seams or the type of yarn used for weaving.<sup>8</sup> Thus, the decision made by businesses not to adopt such methods was conceivably an act of rationality, on the basis that these techniques would be neither physically, nor financially viable.<sup>9</sup>

Related to the debate surrounding Britain's use of techniques and technologies are a series of comments dealing with the industries in which Britain specialised. It has been alleged that a failure to adopt some of the 'new industries' of the late nineteenth century contributed to the economic slow-down of 1873 to 1913. Kirby believes that an over commitment to the old staple industries; iron and steel, coal, cotton textiles and ship-building, prevented Britain from moving towards new methods of industrial production at the same rate as her overseas competitors. By 1907, staple products accounted for fifty per cent of industrial output and twenty five per cent of labour employment.<sup>10</sup> With the exception of the cotton industry, this sector also rarely employed women, even though, as the following sections will show, a number gained scientific and technical qualifications which in theory prepared them for skilled and technical posts within firms. In practice however, prejudice and discrimination in the ranks of industry, and the lack of openings in newer light scientific industries such as pharmaceuticals and electrical engineering, because of the British bias towards the staple

industries, meant that before the First World War, progress was slow. Of particular concern to many historians is not just that Britain retained these staple industries, but that by their nature such sectors were unlikely to adopt the new mass production methods connected with some of the newer industries being developed abroad, and were capable of only slow growth rates.<sup>11</sup> A good deal of research has focused on Germany's pioneering developments in new industry in contrast to Britain's, and a vast array of this work points to the success of the chemical, and especially the dyestuffs industries in which she dominated the market.<sup>12</sup> The impact of the German chemical industry was indeed substantial. However, Britain also had a number of successes in newer industries such as bicycle, soap, food and drink and telegraphic equipment manufacture and also had a growing service sector.<sup>13</sup> Although Britain did not dominate a large industrial sector such as the chemical industry, she played a part, if indeed a smaller scale one, in a wider range of industries.<sup>14</sup>

Arguments in Britain's defence have focused on her 'early start' in the industrialisation process compared to her overseas rivals. This meant that increasingly British industry was overburdened with old plant, techniques and methods of production and that because the time and cost involved in replacing stock was so great, Britain was unable to compete with the growth rates observed in other countries. There was also less scope in Britain than overseas to increase productivity through mobility of labour.<sup>15</sup> Kirby disagrees with this assessment claiming that Britain's long expertise and accumulation of social overhead capital should have made the adoption of new techniques easier, not more difficult.<sup>16</sup> In addition, the 'early start' theory cannot be applied to all industries, because not all industry had its roots in the early industrial revolution. The argument is not, however restricted to the timing of an industry's development, but also to a set of attitudes which developed during the early industrial revolution, and were increasingly disregarded by entrepreneurs in later Victorian Britain.



Walker contends that a conservative approach to change developed among late nineteenth century industrialists, who in many cases were the third generation to have control of family businesses. Arguably, they became preoccupied with raising their social and political status rather than taking a keen interest in their firms and continuing to innovate. This may go some way towards explaining the stagnation of many of the industries which had been dynamic in the early nineteenth century.<sup>17</sup> Wiener terms this 'third generation syndrome' a 'decline of industrial spirit',<sup>18</sup> which grew out of an increasing revulsion of materialism and practical industry and an espousal of gentility and 'fair capitalism', developed through the public school ethic. Coleman points to the growing concern of middle-class businessmen to send their sons to public school in order to gain a classical rather than a practical education. The implication is that they were guided by considerations of status and not business rationality.<sup>19</sup> There are flaws in this argument. Firstly, there was nothing new about 'gentility'. Rural, anti-industrial idealism had been in operation well before the nineteenth century, probably in stronger form before the middle-classes had a political voice, and yet Britain still industrialised.<sup>20</sup> Thus to present a lack of industrial spirit as a cause of late Victorian industrial decline is to overlook the fact that industrialisation occurred in the face of far more massive obstacles. Secondly, to talk of a 'third generation syndrome' is to dismiss the fact that many early industrial firms did not make it right through to 1913, and that others were new, having been established in the late nineteenth century. Thirdly, the records of early industrial firms still in operation by the First World War are undoubtedly sketchy, and therefore an accurate picture of industrial conservatism is hard to construct.

Other bodies have borne the brunt of criticism for Britain's poor economic performance. The state has been accused of failing to take a leading role with regard to industrial development, shown through a reluctance to adopt protectionist policies,<sup>21</sup> an unwillingness to invest public money in industry and a disinterest in regulating industrial output or

organisation,<sup>22</sup> although it has been argued that the relationship between the state and private industry had long been one of laissez-faire and therefore that the adoption of some of the above actions would not have been deemed 'rational', or natural. A strong state lead in newly industrialising countries such as Germany and the USA was more necessary, and more acceptable, therefore it encountered less opposition than in Britain. It was not so much a case of state intervention in such countries, as of the state leading industrial development. In addition, there is no clear evidence that all British industries were in favour of protection.

Similarly it has been argued that the trade unions were unduly disruptive, and that working-class militancy, strikes and obstruction to industrial change may explain the poor performance of some industries in the late Victorian and Edwardian periods.<sup>23</sup> However, on a crude statistical level, it appears that there were fewer days lost through strikes between 1899 and 1913 in Britain than there were in Germany. Mitchell found that around 111 million days were lost in Britain in contrast to approximately 120 million in Germany.<sup>24</sup> If these strike figures are compared to the size of the labour force of each country, 17.3 million per annum in Britain and 23.8 million in Germany,<sup>25</sup> the impression is reversed and it can be seen that Germany was, on a per head of the population basis, less militant than Britain. However, the extremely high strike rates in Britain in 1912 where over forty million days were lost undoubtedly skew these figures. If strike rates for the period 1900-1911 alone are covered, a more representative account of British strike activity can be gained, and it can be seen that on average the German population engaged in strike activity more often than the British.<sup>26</sup> However, the difference is fairly marginal, and does not prove that unionism had a more disruptive effect on industrial growth in one country than the other. A more important question is whether trade unions intended to create disruption, or whether they merely acted through genuine fear for jobs and loss of stability, which came through mechanisation.<sup>27</sup> To accept the notion of 'intent' is to suggest that conservatism was

somehow inherent in the British working-class and that there was a conspiracy against change. Secondly, there is a danger in regarding high wages and standards of living as a cause of economic depression,<sup>28</sup> when in reality human wellbeing must be considered an integral aspect of economic success. Keith Burgess has noted that the period of falling prices between 1873 and 1896 created a rise in real wages, meaning that in general the population was better-off than in previous periods.<sup>29</sup>

‘Average real wages rose by about forty per cent between 1862 and 1875. They sagged for a year or two in the late 1870s, but were back to the old level by the mid-eighties and after that climbed rapidly’.<sup>30</sup>

Data on wage levels and the cost of living have generally been extracted from trade union records, which were far from representative of the whole of the working class in the period 1870-1914,<sup>31</sup> given that during the 1870s only around four per cent of the working population were trade union members, a figure which had risen to around seventeen per cent by 1911.<sup>32</sup> Thus, a minority of the workforce were represented by trade unions, were generally male, skilled trade workers and thus more affluent than women and unskilled workers for whom the average standard of living was much lower. In the late nineteenth century, women earned as little as one third to one half of the value of male wages.<sup>33</sup> Thus, the improvement in real wages that Burgess outlines may not have affected all workers. However, the low rate of union membership does imply that any notion of labour as a threat to industrial output must be considered sceptically. Recently, Charles Feinstein compiled a revised average money earnings index which allowed a large margin of error for non-unionised industries, for the period 1880-1913. The outcome of his study was that average earnings indeed increased by forty one per cent between 1880 and 1913.<sup>34</sup> So it seems that the economy did succeed in raising the quality of life for the majority, although for those suffering from unemployment or the uncertainty of casual labour, the standard of

living improved less markedly.<sup>35</sup> The rise in average living standards was a positive feature of British economic performance, which should lead to some reinterpretation of the view that the economy was in depression.

Finally, it has been argued in depth, that British industry in the late nineteenth and early twentieth centuries was starved of finance, not just by the state, but also by the banks, which unlike those in Germany had low levels of linkage with industry.<sup>36</sup> One of the reasons for this was a preference for investment in overseas assets which gave higher rates of return than British industrial investments.<sup>37</sup> This debate need not be outlined in full here as it is detailed and lengthy.<sup>38</sup> However, along with a range of other causal factors, many of which have already been outlined, it contributes to an understanding of why the British economy slowed down after 1873. It appears that there is no monocausal explanation for this trend. However, arguments that British technological developments were backward, that industries were antiquated and that businesses were resistant to change are common, and tend to be tied in with the issue of Britain's poor provision of scientific education and technical training, and subsequent lack of highly trained individuals, capable of enhancing economic performance. The following section considers in detail the impact of education and training on economic performance and exposes a somewhat neglected feature in this debate, the availability of education and training for women and the effects of female skill and expertise on economic development.

## **EDUCATION, TRAINING AND THE ECONOMY**

At various points from 1870 onwards, education and training became matters of national concern for Britain. An early example was Britain's poor performance in the Paris Exhibition of 1867 where her position shifted from the first place held in the Great

Exhibition of 1851 to ninth place.<sup>39</sup> A succession of Royal Commissions began to identify a lack of education in new technological methods as a possible explanation for this poor comparative performance in 1867.<sup>40</sup> Another reason for growing concern over education was Britain's changing industrial structure.<sup>41</sup> Firms increasingly required personnel trained in new technological methods because newly developing industries such as chemicals, light engineering, pharmaceuticals and plastics were based on more 'scientific' modes of production than the staple sector. Particular concern was expressed over training in these methods, because Britain appeared to be lagging behind other countries in her development of such industries. 1900 was also the height of the Boer War, and Britain's poor performance led to discussions as to whether her supply of people trained for military and strategic purposes was sufficient.<sup>42</sup> The contemporary view that education in some way influenced economic growth, along with the subsequent writings of many historians on the subject, suggests that it is an area worthy of attention.

A good deal of the literature on education and economic performance focuses on university education in the period, and students studying science degrees. Albu, for example, in his study of the engineering industry claims that the number of graduates was lower in Britain than in Germany.<sup>43</sup> Similarly, Alter shows that the number of students in German universities was high in comparison to Britain.<sup>44</sup> By 1911 70,183 students were enrolled at German universities, compared to only 28,000 in Britain.<sup>45</sup> However, there are problems associated with carrying out a head count of the number of students in German and British universities without taking into account the difference between the population sizes of each country. If these figures for university attendance are compared to the population sizes of their respective countries, the difference is quite slight. In 1911, the German population stood at over sixty four million,<sup>46</sup> of whom university students comprised 0.11 per cent whilst the combined total of all British countries was over forty six million,<sup>47</sup> of whom

university students accounted for 0.06 per cent. The proportion of university students based on the populations of England and Wales alone<sup>48</sup> was 0.08 per cent. Germany thus had the lead, but a smaller one than originally appeared to be the case. Importantly, in both countries, university students accounted for a tiny proportion of the total population, and thus perhaps too much effort has gone into outlining Britain's deficiencies in this area.

University education was not the only form of training in technological methods in late nineteenth century Britain, although it has frequently been given precedence in the literature. This, it seems, is because, it can directly be compared with Germany, the USA and other industrial nations, and therefore easily criticised. Sanderson, for example, makes a good case for the importance of education per se, but does not adequately explain why university education was particularly important over other forms of training.<sup>49</sup> Sidney Pollard has claimed that a large amount of theoretical scientific education was in fact not relevant to the day to day needs of industry,<sup>50</sup> although with effort from both graduates and business leaders, scientific knowledge could usefully be applied in highly skilled and technical posts.

The universities should not be dismissed, as they undoubtedly played an important role in a whole range of educational activities, not just technical and scientific. Saul presents a long list of British 'successes', for example the modern red brick universities which were built at the turn of the century, the setting up of the Imperial College of Science and Technology in 1907, and the role of key pioneering individuals within the universities, such as Henry Roscoe at Manchester University who became a close competitor of the German universities in chemistry.<sup>51</sup> Sanderson has shown that the developing civic universities such as Sheffield, Birmingham, Reading, Manchester, Liverpool and Southampton were built on industrial capital, drew large numbers of their students from the industrial classes, and especially in the cases of Birmingham, Manchester, Sheffield and Liverpool, focused on

technical and industrial training. Interestingly, as later evidence will show, women comprised significant proportions of the student bodies of these universities. It is because so much literature has focused on the work of Oxford and Cambridge, he argues, that an image of a 'lack of industrial spirit' has been portrayed. David Edgerton agrees, suggesting that the work of writers such as Martin Wiener and Correlli Barnett have failed to compare like with like by focusing on Oxbridge in Britain and the Technische Hochschulen in Germany: 'The contrast is vivid: Oxbridge turns out public servants; the Technische Hochschulen turn out engineers'.<sup>52</sup> Each type of institution was set up specifically to achieve these objectives. Thus a direct comparison of the two is of limited value. Women comprised a much smaller contingent at the old universities. This was partly a result of restrictive policies such as the refusal to award women degrees until 1920 at Oxford and degree titles until 1923 at Cambridge. At the latter, women did not gain full membership before 1947. However, at both universities women could sit their degree examinations from the 1880s, thus gaining a degree in all but title. It was also because Oxbridge housed a small number of women's colleges which in turn each accommodated a small number of women. Women who wished to gain a higher education thus often had to turn to the newer universities.

Fox and Guagnini contend that even the image of the Technische Hochschulen as the epitome of technical training is not accurate. By the turn of the twentieth century, they argue, German industrialists were bemoaning the poor training in industrial techniques gained by scholars at the Hochschulen. Similarly in France, the curriculum of the École Polytechnique, praised as a school of engineering, was dominated by pure mathematics. Only thirteen per cent of students took up industrial careers whilst seventy four per cent entered the army. Fox and Guagnini thus argue that mathematics and the physical sciences could be equally as unfavourable to industry as the classics.<sup>53</sup> Further flaws in the view that German education

was more applied to the needs of industry than the British system have been exposed by Peter Lundgreen and David Edgerton<sup>54</sup> but need not be outlined in detail here because the intention is not to demonstrate the superiority of one nation over another. Indeed, this chapter will demonstrate that Britain had a unique education system which needs to be explored in its own right, and should not be considered inferior or superior to the types of education which were common overseas. Neither is it the purpose of the thesis to compare the position of British women in education with that of women in other countries, although it has been recognised that women gained earlier access to universities in Britain than in Germany and France<sup>55</sup> although provision in the USA was generally superior to that in Britain.<sup>56</sup> The praise which has been awarded to German universities by a number of historians is thus evidence of an androcentric view of education and training. Given that women could not matriculate to gain university places until the turn of the twentieth century in Germany, it is curious that so many accounts have pointed to the superiority of German over British universities, where women were able to enrol as undergraduates as early as 1878. Women's experiences it seems, are regarded as peripheral in studies of education and training, especially when the discussion deals with the links between the former and industry. The following chapters will show that women had more than peripheral involvement in British universities, and thus that they should not readily be dismissed.

There were varying technical institutions which fell outside the university system in Britain. The mechanics institutes, which were privately operated until 1852, when they were placed under the Department of Science and Art, the City and Guilds Institute which was responsible for a large percentage of examinations in technical subjects, and later the emergence of technical colleges, many of which took over from the old mechanics institutes and were brought under local authority control.<sup>57</sup> Most of these institutions offered courses at different levels on a day and evening basis, with the newer technical colleges offering a



growing number of full-time courses. The greatest criticism of such institutions is that they were organised on a piecemeal basis with no coherent policy and that the level of education they offered was inferior to that of the universities. Michael Argles has shown however, that from 1870 onwards there was a growing awareness of the needs of technical education, and that between 1881 and 1902: 'The cause of technical education in Britain made more rapid strides forward than it had done in any period so far'.<sup>58</sup> In contrast to other writings, he presents the view that state initiatives increased, more money became available for education and local authorities began to promote its importance. As evidence, he points to the growing amount of legislation which dealt with technical instruction in this period.

The 1881 Royal Commission on Technical Instruction produced a set of recommendations on the role local authorities should play in providing grants to technical colleges, and the level of training that prospective teachers should receive. This, made possible the passing of the 'Technical Instruction Act' of 1889, which enabled local authorities to raise a penny rate in support of technical education.<sup>59</sup> At this stage the legislation was only permissive, however it signified a growing political awareness of the importance of technical education, and as Sanderson has shown, 160 towns complied with the legislation.<sup>60</sup> The Local Taxation Act of 1890 gave authorities the option of using 'whisky money' obtained from the customs and excise duties to promote technical education locally. Again, this was not mandatory, but Argles notes that by 1892, the London technical education board was diverting whisky money to local colleges quite substantially.<sup>61</sup> The notion that the British educational system was ad hoc and decentralised may be true, but according to Fox and Guagnini, both France and Italy experienced a similar lack of centralisation and central funding for education. Local initiatives in both countries however, were significant, with the French provinces and towns such as Turin and Milan setting up technical and engineering schools independently of central government.<sup>62</sup> The tendency of British technical schools

to be organised on a local scale should thus not be seen as particularly unusual or as synonymous with educational failure.

The new polytechnics, developed in the 1880s, were also of key importance in the movement for technical training. Unlike the universities, these institutions developed from a primarily technical base, many being extensions of the mechanics institutes and technical colleges. Although the polytechnics did not have the same prestige as the universities, the level of education they offered was high, although they did not begin offering degrees until well into the twentieth century. Unlike most universities many of their courses were vocationally adapted to the needs of industry, providing courses in technical instruction, and crucially a large proportion of their students were female,<sup>63</sup> demonstrating that women were not attracted only to non-vocational education. They also acted as recreational clubs, primarily to those of artisan and lower-middle-class status, thereby offering educational and social opportunity to a wider sector of society than the universities. Speaking of the growth of London polytechnics by 1904, Sidney Webb stated:

‘The typical London polytechnic is an institution .... for the provision of instruction, recreation and social intercourse, for young men and women of the wage-earning and "lower-middle" classes’<sup>64</sup>

In addition to education and training provided in institutions, Britain was renowned for training which was carried out ‘on the job’,<sup>65</sup> in the workplace. A large number of commentators have judged in-firm training and apprenticeship systems as an explanation for Britain’s conservative attitude towards technical education,<sup>66</sup> viewing such methods as a hindrance to development, rather than as an integral part of the education system:

‘The ‘rule-of-thumb’ methods and ‘practical-tinkering’ of the pioneering phase of the Industrial Revolution were the curse of

large sectors of British industry, and they went hand in hand with increasingly outmoded forms of industrial organisation, based on small-scale family firms or partnerships'.<sup>67</sup>

This assessment may be somewhat flawed. 'On the job' training should not be described as a cause of educational failure, simply because it was different from the style of education which was operated overseas. Thus, Britain can, to a certain extent, be treated as a 'unique case' with direct international comparisons being inappropriate. Education was used as part of a drive towards industrialisation in Germany and the USA whereas the British economy was at an advanced state of industrialisation, and therefore its emphasis on training was different. 'On the job' training was often in the form of an apprenticeship, which according to Bernard Elbaum provided an excellent preparation for industrial work. He argues that the apprenticeship system was advantageous to Britain, and that the USA was weakened by failing to develop this aspect of in-firm training, and therefore had no choice but to develop mechanical methods of production. His is one of the few articles which places company training at the centre of the discussion and assesses other countries' performances in relation to it. He argues that both the employer and the young worker benefited from the apprenticeship system in Britain. The firm gained financially, and the worker endured an initially low wage as a sacrifice for gaining greater skill and experience. The system also enabled young working-class males to fulfil their expected social role of subsidising the family income, whilst gaining skill and experience.<sup>68</sup> A full-time course in an institution did not provide this benefit.

He recognises the problem however, that young workers often became 'tied' to one firm and therefore became vulnerable to exploitation by their employers, although the indenture system provided legal protection against this occurrence, and when an apprentice gained his or her 'lines' on completion of training, work prospects expanded significantly. Elbaum also notes that apprentices were no more likely to suffer low wages and poor conditions than other

youths at the turn of the century, and therefore as a short-term hardship, the apprenticeship system presented a sound basis for industrial training. The gender specificity of the apprenticeship system meant however, that British women were disadvantaged when attempting to gain technical training. The impression is that few women secured apprenticeships. However, as Joan Lane has pointed out in her study of technical training in Coventry and the Midlands, girls names were not included in the city's registers, in which apprentices were registered, because they were not eligible to vote before the First World War, and thus they were simply not enumerated.<sup>69</sup> The impression that few girls were apprenticed may thus be more apparent than real. It is commonly accepted that if women wished to be trained they normally had to attend an institution to do so. Their treatment in the various educational establishments of the pre-war era will be discussed in detail in the next chapter.<sup>70</sup> The advantage of considering education provided in institutions is that records of women's roles are less commonly obscured, and thus that meaningful comments about their participation can be made.

The general impression one receives when reading histories of education and training is that women played a marginal role, especially in technical and scientific subjects, which are believed largely to have been a male preserve.<sup>71</sup> Michael Sanderson has pointed out that of the small proportion of women who did study science and technology, the number who later embarked upon careers in industry was even smaller. Talking of the birth of women's colleges in London he states:

'And yet these developments ... had little impact on the relations of the universities and industry before 1914 ... There is no trace of industrial motives behind the setting up of the women's colleges (although) some did receive financial help from industrialists.'<sup>72</sup>

If the view that female participation in higher education was low, especially in science and technology subjects is accepted for the moment, although it will be challenged later, some explanations need to be offered. It can be alleged that firms were unwilling to train women for technical positions or to open up apprenticeships on a large scale, because women were seen as short-term members of the work force, who would marry and leave work to have children, therefore long-term training was inappropriate. Women were regarded as physically weaker than men and therefore not capable of participating in some branches of engineering, although this argument did not prevent the employment of women in the textile factories, nor in the sweated industries of the late nineteenth century.<sup>73</sup> In addition, because women were not considered to be family 'breadwinners', their wages were regarded as secondary to male earnings, hence highly paid careers, or work which required training was seen as unnecessary and a waste of resources. This helps to explain why so many women were constantly confined to poorly paid work, with little chance of promotion. Alternatively, educational establishments may be taken to task for making access difficult for women, especially in departments of science and technology. Even in the apparently egalitarian University of London, where women were admitted as undergraduates from 1878 and in the new civic universities such as Manchester, Leeds, Sheffield and Liverpool, which admitted women from the outset, access to faculties of science was often restricted to men initially,<sup>74</sup> thus reducing women's chances of gaining science qualifications, and encouraging more to study arts courses which were less selective.

Finally, it has been argued that women themselves avoided education and training which had vocational applications. When they did decide to study, it is said that most had a preference for classical and arts subjects which added to a woman's list of 'accomplishments' and graces and thus enhanced her social status and chance of meeting an eligible marriage partner. Dyhouse has demonstrated that of the first generation of university educated women of the

late nineteenth century, a fair number were 'ladies of leisure' seeking single classes to raise their levels of cultural appreciation.<sup>75</sup> Alternatively, assuming there was a low level of demand for vocational courses, this may have arisen because women were aware that careers in industry were hard to come by, and that following a course of study in science or technology would merely lead to frustration in achieving long-term goals. Thus, they might have studied arts courses, not because they were non-vocational, but because they offered a range of skills which could be used in various professions, not least teaching, in which there were fewer obstacles.

The following chapters will consider, firstly the extent to which women participated in higher and further education, especially in science and technology, and secondly whether their decisions regarding which courses to study were self imposed or whether restrictions preventing women from participating in certain disciplines meant that they were directed towards 'approved' subjects. It is very easy to draw the conclusion that women in late nineteenth century Britain gained a fairly minimal level of scientific and technical education and training because so little has been written on the subject, especially with regard to technical training for women, within or outside the firm. There is some literature which considers the provision of scientific and technical education within institutions however. Roderick and Stephens for example, have shown that the Liverpool technical instruction committee supported classes for women and girls by 1902, by offering a grant of £385.<sup>76</sup> In comparison to the £2,100 made available to technical instruction centres for workmen this was a small figure. It may also be atypical because Liverpool had an especially pioneering education authority. However, their information shows that careful research can highlight where changes in opinion and strategy were occurring, and that more work needs to be carried out to gain a complete picture of women's position.

MacLeod and Moseley, in their account of women at Cambridge University argue that false assumptions have been made about women's role in higher education, based on generalised and incomplete research. In particular, they recognise that women who studied sciences are frequently forgotten or undiscovered, and that this gives an impression of a low level of female involvement.<sup>77</sup> At Cambridge, between 1880 and 1910 this was, to a certain extent, true. Women comprised just over eleven per cent of students studying natural science triposes whilst in history and moral sciences they accounted for twenty two and twenty three per cent respectively. In languages, women made up over fifty five per cent of the student body. Across all subject areas, their rate of participation was 15.6 per cent, a relatively low level of participation, and sciences attracted a smaller proportion of women than the average.<sup>78</sup> In addition, MacLeod and Moseley indicate that few female natural science graduates from Cambridge entered industrial careers after completing their studies. The majority became teachers or medical workers of some kind.<sup>79</sup> The findings from this case study imply that women were under-represented in technical and scientific subjects in the universities, a feature which is supported by evidence from Oxford. Janet Howarth has shown, for example, how Professor Vines, a botany lecturer refused to accept women students after his appointment in 1888 unless they were guaranteed to obtain a first class degree.<sup>80</sup> The likelihood of a student being a definite candidate for a first on enrolment was fairly slim, and thus this regulation effectively barred women.

It is not disputed that there were restrictions on female study in Victorian Britain. However, other universities such as the University of London and the newly emerging provincial universities had more enlightened policies and attracted higher levels of female science students, a point made by MacLeod and Moseley,<sup>81</sup> although, as previously stated, even these universities did not all admit women to science classes from the outset. Perhaps because little research has highlighted the achievements of women in science education, there

has been a lack of interest in their later occupations and achievements in the labour market. The following chapters attempt to redress this, by bringing to the fore a number of women who gained scientific and technical education and training, and tracing their post-graduate activities. Given that British industry allegedly suffered from a deficiency of well trained individuals, it will be interesting to establish how these women used their qualifications.

It is generally accepted that between 1873 and 1913 women's role in the labour force was secondary to that of men, both in quantitative and qualitative terms. Mitchell has shown for example, that the total number of women involved in economic activity was less than half the male figure for all years between 1871 and 1911.<sup>82</sup> In addition, the types of occupation in which women clustered tended to be different to those of working males. It should be stressed however, that the census information before the First World War and afterwards, undercalculated the number of women in the workforce, excluding in particular those who worked in family businesses, and engaged in temporary, part-time and casual work. Such areas of employment were often an important source of income for married women.<sup>83</sup>

‘There is a growing body of evidence which indicates problems with the recording of the work of women in the censuses. Women often worked on a casual or part-time basis and this labour frequently does not appear to have found its way into the returns as an ‘occupation’.<sup>84</sup>

This discrepancy is demonstrated in Morrison-Low's account of women who worked in the scientific instrument trade in the nineteenth century. Many women kept the books in family firms, continued businesses after their husband's death, and there is even evidence that women were the driving force of some businesses, but that their firms operated under the name of a husband. Such women have been ‘hidden from history’ because they are not enumerated in the censuses after 1881.<sup>85</sup> A further problem is that the category ‘indefinite’ in the 1881 census covered unemployed males and ‘loafers’, but women who were general



labourers, shopwomen, assistants, apprentices and machinists. These women were certainly not inactive, but neither were they classified as 'employed'.<sup>86</sup> Pat Thane states that of the women who were enumerated, something in the region of two million worked in domestic service in this period.<sup>87</sup> This is borne out by the census returns which indicate that 'services' accounted for virtually fifty per cent of female labour on average between 1871 and 1911. The male average was only just over nine per cent.<sup>88</sup> It seems that the vast majority of these female service workers were domestic rather than professional although new forms of service employment were developing as areas of work for women in the late nineteenth century. The other major employer of women was manufacturing industry, especially textiles, although as Deane and Cole note, women tended to work in positions which held little chance of promotion and were deemed 'unskilled', rather than in highly paid or technical posts.<sup>89</sup> Addressing the rise of those employed in domestic service from 1.8 million to 2.6 million between 1871 and 1911 they state:

'The fact that such a high proportion of the working population remained in this relatively unproductive occupation set certain limits to the rate at which average overall productivity could expand before the Second World War.'<sup>90</sup>

Thus, they propose a link between poor economic performance and under-utilisation of labour and especially female skill. However, they undervalue the 'supportive' role which so many women played in the economy, and it is also incorrect to imply that all female service employment was domestic work. A wide range of professional services were developing between 1871 and 1911, in which women were gradually becoming involved. The female clerical labour force rose from five per cent to eleven per cent of the total between 1891 and 1901, and the number of female nurses, teachers and shopworkers also increased.<sup>91</sup> However, few women worked in managerial positions. Jobs of authority were still very much a male preserve, although women's influence in commerce and finance was increasing throughout the period. Of the total number of men and women who worked in

commerce, women accounted for only 2.3 per cent in 1871, but 17.5 per cent by 1911.<sup>92</sup> Women's overall participation was thus growing significantly, although in absolute terms their presence was still small. The categorisation of occupations in the censuses often obscures the true nature of the work which some of these women undertook. It has been shown, for example, that 'service' employment incorporated a range of occupations from domestic to clerical work. Similarly, not all who worked in the manufacturing sector were manual labourers, others may have been technicians, engineers or scientists. Chapter five offers some insights into the careers embarked upon by a highly educated group of women with scientific and technical qualifications, and aims to establish whether they were able to procure skilled or professional employment which was fitting to their abilities, and advantageous to the economy. Firstly, the position of women in education and training before the First World War will be considered through detailed studies of University College London and the polytechnic at Regent Street, and a specific focus on women who studied science and technology. Before the findings of these studies can be discussed, a general outline of women's position in society in the late nineteenth and early twentieth centuries and a more detailed discussion of their experiences in education will be presented, to provide a context for understanding their levels of participation at U.C.L. and the polytechnic.

## NOTES TO CHAPTER ONE

1. For a summary of literature on the alleged 'mid Victorian boom' see: R A Church (1975), introduction. Church himself argues that the concept of high prices and prosperity between 1853 and 1873 is problematic. Whilst raw materials rose in price quite dramatically, semi-manufactured goods such as cloths and yarns were far less volatile. Also, price inflations were very dramatic at the beginning of the period, 1850-57, and the end of the period, 1870-73, which has created an impression of a long 'boom'. The surge in prices up to 1873 has also made subsequent economic performance appear worse than it actually was, pp. 13-16.
2. K Burgess op.cit, p. 254. For a detailed discussion on the significance of growth, see: D H Aldcroft (1964), p. 113; K Burgess (1988), pp. 254-5; R J S Hoffman (1933), pp. 77-9; W P Kennedy (1982), p. 106; M W Kirby (1981), pp. 2-3; W B Walker (1982), pp. 19-20; R C O Matthews, C H Feinstein and J C Odling-Smee (1982), especially introduction.
3. R C O Matthews (et al), op.cit, p. 22 and p. 31.
4. For a detailed impression of the uses of different growth measurements see: D H Aldcroft (1964), p. 124; N F R Crafts (1986), p. 63; W B Walker (1982), p. 20; R J S Hoffman (1933), p. 78.
5. D H Aldcroft (1964), p. 124.
6. For a full debate on definitions and importance of technology see: D H Aldcroft (1964) pp. 115-18; D C Coleman and C MacLeod (1986), pp. 588-94; M W Kirby, op.cit, pp. 5-6; A L Levine (1967), pp. 10-13; L G Sandberg (1985), pp. 107-18.
7. A Sked, op.cit, p. 15; K Burgess, op.cit, pp. 256-7.
8. L G Sandberg, op.cit, pp. 116-17; A Sked, op.cit, p. 15.
9. For detailed evidence of the responses of firms in different industries see: L G Sandberg, op.cit, pp. 107-18.
10. M W Kirby, op.cit, pp. 3-4.
11. D H Aldcroft, op.cit, pp. 121-3; W P Kennedy (1982), p. 106.
12. For examples of the importance of the German chemical industry see: D H Aldcroft (1968), pp. 32-3; D H Aldcroft (1964), p. 118; J Wrigley (1986), pp. 170-72.
13. L G Sandberg, op.cit pp. 107-118; A Sked, op.cit, pp. 14-7.
14. The work by John Cantwell (1991) pp. 43-59, shows that, although behind Germany in terms of her share of US patents generally, Britain dominated in certain industrial areas such as rubber tyres, motor vehicles and few forms of viscose yarn production.
15. M W Kirby, op.cit, pp. 5-6; W B Walker (1982), pp. 22-3; B Elbaum and W Lazonick, op.cit, p. 571.
16. M W Kirby, op.cit, p. 6; W B Walker, op.cit, p. 23.
17. W B Walker, op.cit, p. 23.

18. M J Wiener (1981), pp. 88-92.
19. D C Coleman (1973), pp. 97-8.
20. D C Coleman and C MacLeod, op.cit, p. 599.
21. B Elbaum and W Lazonick, op.cit, p. 573.
22. K Burgess, op.cit, pp. 262-5.
23. B Elbaum and W Lazonick, op.cit, p. 573; W B Walker, op.cit, pp. 23-4.
24. W B Walker, op.cit, p. 24 (Quoting the findings of B R Mitchell); B R Mitchell (1975), p. 182 and p. 190.
25. B R Mitchell (1981), p. 164, p. 171, p. 182 and p. 190.
26. Ibid.
27. D C Coleman and C MacLeod, op.cit, pp. 606-9.
28. R J S Hoffman, op.cit, p. 87. Germany's economic success partly rested on the willingness of her workforce to 'work for a pittance'. German workers were 'generally more thrifty' and did not spend all their wages in cafes and theatres; the implication being that the British did.
29. K Burgess, op.cit, p. 258.
30. E J Hobsbawm (1968), p. 260.
31. K Burgess, op.cit, pp. 259-60.
32. Calculations based on figures from B R Mitchell (1975), p. 163; E J Hobsbawm (1968), p. 155 and p. 165; E Hunt (1981), p. 295.
33. S Pollard (1992), p. 14; P Thane (1981), p. 235; W J Reader (1966), p. 172.
34. C H Feinstein (1990) pp. 601-14.
35. C Dyhouse (1978), pp. 73-4.
36. B Elbaum and W Lazonic, op.cit, p. 572; K Burgess, op.cit, p. 162; Y Cassis (1990), pp. 3-5; M Edelstein (1985), p. 82; R C Michie (1992), p. 15.
37. W P Kennedy (1974), p. 425; S Pollard, (1985) pp. 493-4 and p. 498 and Y Cassis, op.cit, pp. 11-22.
38. For a more detailed discussion see: N F R Crafts (1979), p. 534-5; D N McCloskey (1981), p. 539; S Pollard (1985), pp. 490-508; M Edelstein, (1985), pp. 71-4; M W Kirby, op.cit, p. 16.
39. E W Evans and N C Wiseman (1984), p. 130. No measurement for this ranking is given by Evans and Wiseman, M Sanderson (1972), p. 9, is more specific. At the Great Exhibition of 1851 Great Britain earned a place of excellence in nearly all of the one hundred or so departments, by 1867 she won in only ten of ninety departments. This implies a decline in quantity and quality of exhibits.

40. O MacDonagh (1975), p. 513; M Argles (1964), p. 31.
41. M Sanderson, op.cit, p. 9.
42. P Alter (1988), p. 271.
43. A Albu (1982), pp. 68-9.
44. P Alter, op.cit, p. 272; R Michie (1988), p. 505.
45. B R Mitchell (1975), p. 772; London and Cambridge Economic Service (1971), p. 9.
46. B R Mitchell (1975), pp. 19-20 and p. 24.
47. Ibid.
48. Ibid.
49. M Sanderson, op.cit, p. 3.
50. S Pollard (1989), p. 122.
51. S B Saul (1979), pp. 116-20.
52. M Sanderson (1988), pp. 91-2; D Edgerton (1991), p. 371.
53. R Fox and A Guagnini (1985), pp. 139-41.
54. P Lundgreen (1984), pp. 62-3 and p. 66; E P Hencock (1990), pp. 302-3; D Edgerton, op.cit, p. 371.
55. F Perrone (1993), p. 341; M Alic (1986), p. 178.
56. C Dyhouse (1995), p. 11.
57. T Kelly (1970), pp. 197-9.
58. M Argles (1964), p. 31.
59. Public General Acts, 52-53 Victoria, Volume 56, chapter 76, pp. 384-8.
60. M Sanderson (1993), p. 2.
61. M Argles, op.cit, p. 40.
62. R Fox and A Guagnini, op.cit, pp. 142-3.
63. An L.C.C. report for the academic year 1908-9 showed that across ten London polytechnics, women accounted for an average of just over thirty five per cent of all students. See L.C.C. Education Committee Minutes (1910), p. 679.
64. Quoted in M Locke (1978), p. 12.
65. K Burgess (1988), p. 266.

66. See for example: D H Aldcroft (1964), p. 119; K Burgess, op.cit, p. 266; A Albu, op.cit, p. 84.
67. M W Kirby (1981), p. 7.
68. B Elbaum (1989), p. 341, 343 and 349.
69. J Lane (1979), p. 5.
70. S Pollard (1989), p. 139.
71. M Sanderson (1972), pp. 314-15.
72. Ibid, pp. 314-15 and pp. 337-8.
73. E Roberts (1988), pp. 41-2.
74. M Tylecote (1941), p. 44 outlines that at the University of Manchester, although women could enter for degrees from 1882, many science options were closed up to the 1890s. This was also the case at U.C.L. as chapter three will demonstrate.
75. C Dyhouse (1995), pp. 23-5; E Davies (1866), pp. 26-7.
76. G Roderick and M D Stephens (1978), p. 75.
77. R MacLeod and R Moseley (1979), pp. 321-2.
78. Ibid, p. 327.
79. Ibid, p. 331.
80. J Howarth (1987), p. 340.
81. R MacLeod and R Moseley, op.cit, p. 325.
82. B R Mitchell (1975), p. 163.
83. K Orr (1994), p. 2.
84. E Higgs (1989), p. 81.
85. A D Morrison-Low (1986), pp. 94-104; P Horn (1988), pp. 72-3.
86. The Yearbook of Women's Work (1875), p. 150.
87. P Thane (1981), p. 235.
88. B R Mitchell, op.cit, p. 163.
89. P Deane and W A Cole (1969), p. 144; D E Baines (1981), p. 165.
90. P Deane and W A Cole, op.cit, p. 145.
91. P Thane, op.cit, p. 235; B R Mitchell, op.cit, p. 163.
92. B R Mitchell, op.cit, p. 163.

**THE SOCIAL CLIMATE**

The late Victorian period has sometimes been portrayed as an era in which little progress or social advancement was made by women,<sup>1</sup> essentially because most studies of 'emancipation' have focused on the battle for the right to vote. The Women's Social and Political Union (W.S.P.U.), with its militant suffrage campaign, normally portrayed as the organisation at the forefront of the women's movement, did not emerge until the early years of the twentieth century, and therefore it has been contended that the late nineteenth century was an 'undynamic' period in the history of women. However, Barbara Caine has argued in contrast that the last decade of the nineteenth century was a 'watershed' rather than a period of stagnation, with a growth in female employment prospects, increasing numbers of women in universities and gradual involvement in local government.<sup>2</sup> Even though women had not yet secured the vote, they were certainly making strides in other areas of social life.

The period 1870 - 1913 was also one of falling population growth, which Banks attributed to a decline in the number of births at a much faster rate than the fall in the number of deaths.<sup>3</sup> The birth rate declined from 35.5 per thousand of the population between 1871 and 1875 to 29.3 per thousand in the period 1896-1900.<sup>4</sup> Anderson also recognises that the birth rate declined between 1870 and the 1930s, so that the number of births per woman fell from around six in the mid nineteenth century to little more than two by the early twentieth century.<sup>5</sup> The causes of this decline in population growth have been debated by many, for example, Banks,<sup>6</sup> Baines<sup>7</sup> and Anderson.<sup>8</sup> Irrespective of the causes however, the result of the decline in family size was that women, in theory, had greater freedom and more time to devote to non-domestic activities such as education. However, Anderson has shown that

a parallel fall in child and infant mortality rates from the late nineteenth to the early twentieth centuries meant that more children were surviving to adulthood. Thus although women were bearing fewer children, the number of dependants for whom they had to care remained very much the same as in earlier periods when women gave birth to large numbers of children but saw a number of them die before they reached the age of five. As Anderson states: 'The benefits to families of falling family sizes can thus be exaggerated'.<sup>9</sup> Nevertheless, women's health, undoubtedly improved by spending a smaller proportion of their lives carrying and giving birth to children, and in addition they were able to concentrate fewer births into a smaller number of years early on in their married lives. Thus the years for which they were engaged in the care of infants was much reduced. Higher levels of male than female emigration before 1913 also increased the proportional presence of women in the population and meant that more women remained single and experienced a need to be self sufficient and independent.<sup>10</sup>

An interesting trend of the last quarter of the nineteenth century, was the introduction of a number of journals and pamphlets which gave advice to women on many areas of life, particularly education and employment.<sup>11</sup> Women, it appears, were presented with a wealth of information and encouragement regarding the pursuit of careers and professions, which must have encouraged many to lead independent and fulfilling lives. In the Englishwoman's Yearbook of 1900, Margaret Bateson stated:

'To declare that until recently there have been few openings for women's employment is one of the commonplaces of statement. I shall not repeat the declaration, for I consider it inaccurate'.<sup>12</sup>

Bateson's argument was that female employment opportunities had not broadened to the extent perceived by the public, but that there had been an expansion in the amount of help and advice given to women, which increased their awareness of opportunities available to



them. This is a further example of the broadening sphere of female influence in the late nineteenth and early twentieth centuries, and shows that an assessment of this period as one of minimal advance is misleading. However, although it is recognised by many historians and feminists that opportunities for women were improving, more so in the field of education than in other areas,<sup>13</sup> it was also the case that dominant attitudes towards women's part in public life remained hostile.<sup>14</sup> June Purvis argues that in spite of female progress in some areas, British society was essentially patriarchal, with an equilibrium between the sexes being maintained by a notion of 'separate spheres' for men and women.<sup>15</sup> Women were believed to be suited to a life within the home, caring for husbands and children and managing their households, whilst men were essentially 'public' beings, engaging in work, social and political roles outside the domestic arena.<sup>16</sup> The reliability of the 'separate spheres' paradigm has been questioned, and will be considered in more detail later. Social relationships in late Victorian Britain cannot be explained only in terms of patriarchy, and Purvis does recognise that the rhetoric of the late nineteenth century was dominated specifically by middle and upper-class males. Therefore, although in theory all women were subject to a patriarchal philosophy, working-class women were affected as much by alien middle-class ideals as they were by a specifically male agenda. The following discussion will show that although the development of policy regarding women in education was often based on considerations of gender, it also reflected social status. Women did not receive the treatment in the educational domain that they did purely because they were women, although this was sometimes the case, but also because they were middle-class or working-class women. Each were not necessarily offered the same routes and their experiences were not homogeneous.

The ideology of 'separate spheres' was not new in the late nineteenth century, but was given moral and scientific credence by biological arguments and eugenicists. As early as 1848,

Auguste Comte had argued that the roles of the sexes were fundamentally different, but also that women were biologically inferior to men. This was illustrated by religious imagery where in the Garden of Eden, woman had been created by man, and therefore was subservient to him.<sup>17</sup> Later, in 1867 Herbert Spencer in his work Principles of Biology continued with this biological reasoning and emphasised the crucial function of women as child bearers. Such views were used to demonstrate that a 'public role' for women was inappropriate. Spencer highlighted education as an area of concern, arguing that any kind of mental labour engaged in by women would induce infertility and inability to breast feed.<sup>18</sup> Carol Dyhouse states:

'Spencer's "biological" explanation of sex differences was premised on the assumption that human physiology was governed by a "fixed fund" of energy ... Women had to spend a major part of their energy in reproducing the species and this lessened their capacity for psychic or intellectual growth.'<sup>19</sup>

Later, in his Principles of Sociology in 1876, Spencer argued that in addition to the immorality of women entering education, any instruction which led them into careers in the 'public sphere', would be wrong, stating:

'Any extensive change in the education of women, made with the view of fitting them for business or professions would be mischievous. If women comprehended all that is contained in the domestic sphere, they would ask no other. If they could see all that is implied in the right education of children ... they would seek no higher function.'<sup>20</sup>

So women were discouraged in theory, by the laws of science, from entering education or professional life. Spencer's reference to public work as a 'higher function' demonstrates that domestic roles, although portrayed as vital to the furtherance of the race, were inevitably regarded as inferior to male activities. The rather extreme nature of the arguments of the Social Darwinists and the disagreements which developed among intellectuals as a result, led

to a period in which they were 'watered down', although many, such as Spencer, adhered to the principles of biological determinism. The attitude which emerged in some circles by the early twentieth century was not so much that education physically damaged women, but that psychologically it disinclined them from settling down, marrying and bearing children.<sup>21</sup> However, this view did not go unchallenged.

An article written by B L Hutchins in 1913 demonstrated that the critics of women's higher education who believed that college life would 'draw women away from matrimony and motherhood' were wrong. She argued that if educated women were compared to the whole female population of Great Britain, they did indeed have a lower marriage rate. Educated women, however, tended to be drawn from the professional classes, and women from this socio-economic background more commonly remained single than working-class women. The article argued that up to fifty per cent of women from professional backgrounds never married, a figure which was much the same for university educated women. Educated women tended to have slightly fewer children per marriage than other women from the same social backgrounds, probably a result of their later average age of marriage due to not graduating until the age of twenty one, but educated married women were also less likely to remain wholly childless. The article concluded that a university education was not the cause of lower rates of marriage and childbirth among upper middle-class women. The reality was, in Hutchins' view, that this sector of the female population, with or without education, was less inclined to marry and raise families than the female population at large.<sup>22</sup>

Although eugenicists attempted to disrupt the movement for women's education, it does not appear that they had a wide influence. Lynn Gordon has shown that the families of women contemplating a higher education did not always believe or trust the views of these so-called 'experts'. Many in contrast encouraged their daughters to gain a good level of education,

an opportunity which they had often not had themselves.<sup>23</sup> Carol Dyhouse has also highlighted significant female resistance to the male Social Darwinists. In 1888, Emily Pfeiffer published Women and Work in which she refuted Herbert Spencer's claims of the biological inferiority of women on the grounds of poor evidence. Her own study described a number of university educated women, who had successfully given birth to and reared children.<sup>24</sup> Similarly, in 1887, Dr Sophie Bryant had shown that the experiences of women who had been educated disproved the views of many of the male medical profession that women would not succeed in both securing higher education and maintaining a 'normal' family life.<sup>25</sup> Joan Burstyn argues that upper and middle-class women were increasingly frustrated by the notion that they should aspire to be 'ladies of leisure' in a domestic environment, and in contrast sought professional careers. She regards the separate spheres rhetoric of the late nineteenth century largely as reactionary:

'Victorian insistence on the sanctity of the home and the family represented an attempt to preserve those institutions from changes already taking place'.<sup>26</sup>

In addition to these attacks on patriarchy, the late nineteenth century witnessed a period of expansion in higher and further education for women, which further suggests that contemporary rhetoric was not always in line with practice. Indeed it seems that most nineteenth century opponents of women's higher education were attempting to prescribe a 'correct' form of behaviour amidst a climate in which women's efforts to gain an education were increasingly being met. They do not seem to have portrayed a realistic image of women's position.

## EDUCATIONAL OPPORTUNITY FOR WOMEN

Educational provision for both working-class and middle-class women had gradually been increasing from around the 1830s. Whilst the history of women in British universities is fairly established, Elizabeth Bird has pointed out that insufficient research has been carried out regarding women's participation in adult education in the late nineteenth century.<sup>27</sup> This is possibly because adult education was a diverse field, which incorporated a wide range of institutions and styles of teaching and thus that it is difficult to draw firm conclusions about women's role. Purvis focuses on four providers of adult education for working-class women: Mechanics Institutes, Working Men's Colleges, Evening Schools and the Women's Co-operative Guild.<sup>28</sup> Thus her study is not comprehensive, but gives some valuable insights into the nature of adult education for working-class women.

The Mechanics Institutes were a development of the early nineteenth century, which had effectively had their heyday by the 1880s. Women were admitted to such institutes from the 1830s, therefore gaining early entry into the allegedly male world of adult education. However the Mechanics Institutes have been criticised for not pursuing their intended aim of providing education for working class people and artisans, but instead for attracting a larger proportion of the lower middle classes. Purvis believes that the Mechanics Institutes increasingly attracted middle-class women, and that when they were admitted, they received different treatment from their working-class sisters: 'When both middle-class and working-class women were educated within the same mechanics institute, each was offered a carefully distinctive educational route.'<sup>29</sup>

For middle-class women, this route incorporated subjects such as English, writing, arithmetic, French literature and philosophy, whilst for working-class women, it covered

mainly practical subjects such as domestic science and needlework, which Purvis argues, would ultimately make them better housewives, but which also raised their chances of securing employment in an economic environment in which career opportunities for working-class women were limited. The implication is that working-class women were subjected to a gendered curriculum which provided little room for personal development. Joanna Bourke exposes a weakness in this assessment, by showing firstly that the working and middle-classes were not necessarily offered rigidly different types of education and secondly that working-class women often approved of courses in domestic training. She argues that the gradual unification of the education system up to the First World War sparked an attempt to create a sense of national identity. Academic subjects such as history were used to foster a sense of 'national consciousness' amongst all pupils, emphasising the importance of being 'British' rather than of being working or middle-class, male or female. The class divisions in education can thus be overstated.<sup>30</sup> It is also easy to assume that the introduction of domestic courses for women was a conscious attempt by middle-class educationalists to allot a suitable 'sphere' to them.

Bourke outlines that in fact, many working-class women celebrated this move, viewing it as a statement that housework was not 'natural' or easy, but a skilled activity for which training was required. It enabled them to take new skills into their homes, and assume control of household consumption and expenditure. Thus it gave them power.<sup>31</sup> It seems that women's own feelings about the education they were offered are too often ignored. Patricia Phillips also demonstrates that not all mechanics institutes merely reinforced domestic roles for working-class girls. Huddersfield and Bradford Institutes both offered the study of physical sciences to mill girls as early as 1859 for example.<sup>32</sup> This is an interesting indication that the notion of a 'gendering' of education in late nineteenth century Britain was

not universal. The environment within Working Men's Colleges however, does not appear to have been so favourable.

The Working Men's Colleges, the first of which was founded in Sheffield in 1848, set out to offer a more solidly working-class education. These colleges were permeated by the ideas of Christian Socialism, and the, by then declining, Chartist movement.<sup>33</sup> In Halifax, a women's section of the college was founded, but it was made explicit that the training was to comprise only domestic subjects, although, as previously suggested, for many working-class women, this was valuable training. Throughout the 1850s and 60s, more colleges sprang up over the country, and women were normally admitted, if somewhat reluctantly. Because of the small range and subordinate status of courses offered to them, women paid a lower entrance fee than men, an advantage in financial terms, but an indication of low quality education compared to that received by men. In 1855 the London Working Men's College was opened to women, but they were refused entry to general meetings, social and recreational clubs and use of the common room. This leads Purvis to comment that not only were women disadvantaged through the curriculum, but also through lack of representation, participation, inclusion in the full student life and in 'formal decision making structures'.<sup>34</sup>

So, although education for working-class women increased through the working men's colleges, the courses they were offered were restricted to a small number of domestic subjects, and in addition there was a 'hidden curriculum' or a range of covert restrictions on women which made their educational experiences less complete than those of their male peers. The fact that these colleges retained the title 'working men's colleges' further highlights their androcentricity. However, a number of Science Schools were introduced from the 1860s which were funded by the state, followed a curriculum established by the Science and Art Department and which had a large working and lower middle-class

attendance. Girls studied physical geography, animal physiology and general biology in large numbers at such schools, and there is also evidence that they took a range of other subjects, from magnetism and electricity to geometry and even building construction.<sup>35</sup> It is inaccurate to suggest that all working-class girls were forced to study a limited range of domestic subjects, and careful research into specific institutions has begun to show that women's experiences in adult education were diverse.

Another option for working-class women was to study at an Evening School. These were often extensions of Sunday Schools which offered fairly basic instruction, mainly in sewing. By the 1880s, they were gradually absorbed into the developing system of technical and further education, which gained state funding after the Technical Instruction Act of 1889, and Local Taxation Act of 1890.<sup>36</sup> Allegedly, vocational courses which were offered to women in this sector were limited to a narrow range of subjects such as domestic work, office skills and cookery,<sup>37</sup> This is certainly the impression gained if one looks at the prospectuses of the evening schools. Bird shows that at Bristol, classes in domestic economy, needlework and dressmaking were offered only to 'young ladies' whilst all other classes were offered to young people of either sex. The same was true of the polytechnic at Regent Street as chapter four will demonstrate. On this basis, Bird argues, there was a 'gendering' of the curriculum.<sup>38</sup> However, the women who attended Regent Street studied domestic science and needlework quite rarely which suggests that they exerted their power of choice whenever possible. A consideration only of prospectuses, and thus official preferences, does not necessarily give a full indication of the types of education obtained by women in the late nineteenth and early twentieth centuries.

Assuming, for the moment, that women did follow these prescribed educational routes, it may have been that classes in domestic science and cookery provided women with training



designed to make them better mothers, or domestic servants, which, as Bourke as shown, was often worthwhile training.<sup>39</sup> In contrast, office skills offered a means for lower-middle class and artisan women to break into the 'public' world of business. Gladys Carnaffon has argued that commercial training in late nineteenth century Britain was crucial to Britain's performance in the world economy, and that it cannot be separated from technical education generally. The development of George Skerry's correspondence colleges in the North of England and Scotland and the Royal Society of Arts, which was open to women from its outset, promoted the study of languages and marketing as well as office skills, and was therefore relevant to Britain's economic wellbeing. Women appear to have benefited more than men from this development. The number of male office workers expanded five fold between 1861 and 1911 whilst the number of women grew over five hundred times in the same period, although the types of work engaged in by men and women were not necessarily the same.<sup>40</sup> The Journal of the Women's Education Union also defined 'technical training' in broad terms. Examples ranged from book-keeping and shorthand, to photography, wood carving, telegraphy, hairdressing and dispensing.<sup>41</sup> A tendency to focus on a male definition of 'technical training' has created an impression that women had little involvement in this area of education which is not accurate. It is true, however, that the skills acquired by many women, such as typing and shorthand, gradually became recognised as 'female work', which carried low status in the eyes of some men, little chance of promotion and, for clerks and secretaries, an average wage of only ten to thirty shillings per week,<sup>42</sup> whilst management positions within firms were reserved largely for men until well after the Second World War.<sup>43</sup> However, compared to traditional female occupations, clerical work was an attractive alternative for many women which carried higher status and was more desirable than trades such as domestic service or textile manufacture.

Education in late nineteenth century Britain was not always 'imposed' on women. In fact there are examples of education designed by women to suit their own needs. In 1864, a separatist Working Women's College was founded in London by Elizabeth Malleon, after complaints from working women that the education offered to them at the London Working Men's College was irrelevant to their needs. The women proposing the new college did not, ideally, wish to segregate education in this way, but felt it was the only way forward given their constant subordination within the male system.<sup>44</sup> The emphasis of this college was on scholarly activity rather than on household training, and gradually the college began offering courses in literature, history, Latin and physiology. By 1874 it had 250 female students. This example of education provided by women for women shows firstly, that there was demand for a broader education than that offered in the male colleges, and secondly, that women did not simply comply with the dominant ideology. Many of the courses offered at this new college attracted middle-class women who had less need of practical training than working-class women but rather sought a liberal education. However, the college also devoted a large portion of its curriculum to the teaching of the '3 Rs',<sup>45</sup> and therefore offered an attractive alternative to the male colleges for some working-class women. In addition, in 1874 the college agreed to allow male students to enrol, essentially because the London Working Men's College refused to amalgamate with the women's college and the founders wished women to have equal opportunity with men in a co-educational establishment. Until the college was closed in 1901, women thus gained the opportunity to study a wide range of subjects, alongside men, such as geometry, bookkeeping, arithmetic and writing.<sup>46</sup> This must have boosted the college's attractiveness to working-class women who did not wish to train for domestic service.

A number of other organisations promoting education for women sprang up in the nineteenth century. In 1867 the North of England Council for the Education of Women was

established, paving the way for a number of local 'ladies educational associations' to emerge. James Stuart was one of the first to lecture to these women on his circuit which included mechanics institutes, co-operative guilds and ladies educational associations. Interestingly he noticed a large working-class audience, both male and female.<sup>47</sup> This was to provide the incentive for the birth of the university extension movement,<sup>48</sup> a development of the late nineteenth century which was of key importance to many women, especially those of middle-class status.

Middle-class women potentially had more opportunities than working-class women both in higher or university education, and further education. Provision for middle-class women within further education establishments such as the mechanics institutes and working men's colleges has already been outlined, and in addition they participated in some educational societies which were open to them from their outset in the early nineteenth century such as the Botanical Society, Zoological Society and Entomological Society. The Linnaean Society, Royal Microscopical, Royal Geographical, Chemical and Royal Societies amongst others however, were closed to women until the twentieth century. Women showed their desire to be involved in scientific education through their campaigns to be admitted to the British Association for the Advancement of Science, founded in 1831. By literally invading meetings and lectures they were finally admitted in 1839. Nevertheless, it was an uphill struggle for women who wished to gain recognition as serious students.<sup>49</sup> The Englishwoman's Review of 1903 claimed that by that date, only thirteen of fifty-one learned societies admitted women.<sup>50</sup>

The history of women in universities has undoubtedly received the most attention from historians. This sector was out of reach for most working-class women, and men, simply because course and, where applicable, residence fees were so high,<sup>51</sup> thus universities

benefited those of middle, and probably upper-middle income groups especially since state scholarships to university did not become available until after the First World War, and even then, very few were on offer. In addition, a number of girls' high schools were established by the Girls' Public Day School Company (G.P.D.S.Co.) from the 1870s, which provided a more academic curriculum for middle-class girls than other private schools of the day, and prepared those of their students who wished to continue their studies for university. Although the fees were more modest than those of many private schools, they were still in the region of nine to fifteen guineas per annum, and therefore too expensive for most working-class families.<sup>52</sup> A contemporary study by Gurney showed that the fees for private schools were between £80 and £300 per annum, which were high enough to exclude some middle-class girls.<sup>53</sup> The schools established by the G.P.D.S.Co. were modelled on Frances Buss' North London Collegiate School which was founded as a private school and then handed over to trustees in 1870. They attempted to correct the fact that, according to Gurney, in 1871 there were only 3,374 girls attending endowed grammar schools, (the term that she used to describe public trust schools) compared to 31,528 boys, because sons still gained preference over daughters when it came to paying for an education, and because few private benefactors were prepared to set up schools for girls.<sup>54</sup> The work of the G.P.D.S.Co. and later the passing of the 1902 education act which increased the number of non fee-paying secondary school places available to boys and girls, thus paved the way for more to enter university at a later date. The combined force of improvements in schooling, the opening of Cambridge local examinations to men and women on the same terms after 1863, (which enabled girls to qualify for entry to higher education),<sup>55</sup> and the gradual opening of university courses and eventually degrees to women made for a period of significant educational advance.

The first moves towards higher education for women came with the founding of separate women's colleges in London: Queen's College in 1848 and Bedford College in 1849. Both gained support from male educationalists, on the basis that they did not compete directly with

male universities and colleges, but rather offered a 'good secondary' level of education for women who had not gained a thorough schooling.<sup>56</sup> By the late nineteenth century, co-educational institutions received annual government grants, but of the women's colleges, only Bedford was successful in securing state funding. Other women's colleges opened later in the century, many striving for recognition as university colleges. Westfield and Royal Holloway College were developed in London in the 1880s, Girton and Newnham at Cambridge in 1869 and 1871 and Somerville, St. Hugh's and St. Hilda's at Oxford between 1879 and 1893.<sup>57</sup> These institutions had to bid for funding in a free market, often falling well short of their targets. Although in theory, educationalists favoured single-sex institutions for both men and women, they gave little practical support,<sup>58</sup> especially to those women's colleges which aimed directly to compete with male establishments. Single-sex institutions were favoured because it was perceived to be too difficult to educate both men and women to the same level co-educationally whilst simultaneously observing sex-role norms, a view which was shared by some female educationalists. Women's colleges such as Oberlin in the USA advocated the separation of the sexes because female administrators believed that male influence would be detrimental to the high social and moral standards held by female students at that institution. The segregation of male and female education was not necessarily an attempt to enforce traditional gender roles, but in some cases was an attempt to maintain a 'positive view of womanhood'.<sup>59</sup> On a more practical note, a significant benefit of single-sex schools and colleges was that they provided a career structure for women teachers, with promotion much more easily achieved than in mixed-sex educational establishments.<sup>60</sup>

Not all women who went into higher education studied alongside other women in the absence of men. Kelly has outlined the history of the University Extension Movement which emerged in 1867 and provided summer schools, and weekend lectures for those who would not normally qualify for entry into the universities. Those who gained in particular were

women and skilled working-class men who traditionally had struggled to gain entry to education of all kinds.<sup>61</sup> In fact Jepson has claimed that the university extension movement owed much to the women's movement, in particular the North of England Council for Promoting the Higher Education of Women, which in 1867 organised lectures in northern cities, primarily for schoolgirls, to boost the education which they received at school, which was often of an inadequate standard to prepare them for school leaving examinations. Women responded eagerly to this opportunity. In 1888-9, two thirds of those who attended lectures were female, the majority middle-class 'ladies' and schoolgirls,<sup>62</sup> and during the summer of 1896, of 653 students who attended the Oxford summer school, eighty per cent were reported to be female.<sup>63</sup>

Women also gradually gained admission to established male universities. An attempt by the University of London to respond to female demand for higher education was to set up special examinations for women in 1866 in subjects which were believed to be popular and suitable, such as languages, literature and history. This attempt was quickly abandoned when women in contrast sought qualifications in the physical sciences, logic, mathematics and the classics, showing firstly, an interest in non-traditional subjects, and secondly, opposition to separate examinations which did not lead to degree titles.<sup>64</sup> The result was that women were finally enabled to enrol for degrees in 1878 at London, 1879 in Ireland, 1883 in Wales, 1892 in Scotland and 1895 at Durham. In addition, the newly emerging provincial universities of the late nineteenth century admitted women from their outset. This presents a picture of increasing opportunity for women, and indeed many have portrayed an image of gradual acceptance, inclusion and diminishing prejudice.<sup>65</sup> However, it may be misleading to argue that there was a linear progression in women's higher education.

Carol Dyhouse has argued that the new civic universities appear egalitarian when compared to Oxford and Cambridge, because they had higher rates of female participation and once they received their charters, all admitted women. This was partly a result of the struggle they faced to recruit students and therefore, as Dyhouse states that 'they could not afford not to enrol women'.<sup>66</sup> It is not clear however, that had these universities found no trouble in recruiting men they would necessarily have been reluctant to accept women. Aside from levels of female enrolment, it has been argued that women did not always gain equal treatment once established. Many faced exclusion from social activities and certain areas of the curriculum such as engineering, law and medicine, even after supposed 'equal access' had been achieved. In addition, as calls for women's higher education were met in the last quarter of the nineteenth century, and progress began, there were disagreements over the function of that education. Not all feminist reformers would have agreed with the following views which appeared in various issues of the Journal of the Women's Education Union of 1873. The author and editor of the journal, Emily Shirreff, argued that a sound education in physiology, moral issues and social economy was important for women, since all could be applied to the role of wife, mother and household manager.<sup>67</sup>

'This is a task for which every woman must fit herself, if she would not perhaps some day, rue with bitter self accusation her unfitness for the office to which nature herself has called her'<sup>68</sup>

Shirreff was a pioneer in the cause of women's education, one of the original council members of the G.P.D.S.Co., honorary mistress of Girton College and co-founder of the National Union for Improving the Education of Women of all Classes. Thus, these views seem rather curious. Kendall suggests that an impression that women chose higher education for domestic and cultural reasons may have arisen from their strategic emphasis on the capacity of higher education to make them better wives and mothers in order to gain

admission.<sup>69</sup> One must remember that Shirreff was writing in 1873, before the opening of established universities to women, and thus that she was attempting to gain public support for female education, by appeasement if necessary. Rogers outlined that at Oxford, when women were first admitted, certain subjects there were also deemed appropriate. Professor Gardner believed that art and religion were suitable areas of study, fitting to women's culture and morality. Rogers argued that such statements were rather unusual, given that women were excluded from divinity degrees and could not enter the ministry. She also expressed doubt that many male artists would have considered their subject 'feminine'.<sup>70</sup>

The statements of Professor Gardner and Emily Shirreff, although similar in tone, were based on quite different sentiment. Gardner's views were broadly paternalistic whilst Shirreff's objective was to focus on female education as a means of cultural and moral betterment which was relevant to women's roles as wives and mothers in order to gain public acceptance. Middle class commentators and especially parents, were often fearful of young women gaining a higher education because it was regarded as a training for later employment. A career in paid employment outside the home was perceived by many middle-class families as an expression that their daughters had 'failed socially', especially if they chose not to marry.<sup>71</sup> For these reasons, the women's colleges complied with social conventions, to the extent that women students had to be 'chaperoned' on and off campus at Cambridge. Emily Davies, who strongly believed that women should compete equally with men in academic and professional life reduced her involvement with the women's movement in order to give a 'respectable face' to the founding of Girton and to secure public support.<sup>72</sup> Julie Gibert has shown however, that the Oxbridge conventions were not universal, and that at the newly developing civic universities, attitudes were much more relaxed.<sup>73</sup> These universities developed along different lines, admitting women from their outset, largely in order to make up student quotas. Many developed day training departments



for prospective teachers which received government grants after 1890, and attracted large numbers of women. School teaching was one of the few professions deemed respectable for middle-class women who needed to earn their own incomes, and thus the day training departments, which after 1911 were offering three year degrees followed by one year of teacher training for women who wished to become secondary teachers, received less criticism than standard university departments which allowed women access as undergraduates.<sup>74</sup>

Cases of overt discrimination within individual educational establishments can always be cited, with Oxford and Cambridge bearing the brunt of criticism and dominating the literature.<sup>75</sup> At least as important, if less often noted, as illustrated by Dyhouse, was the proliferation of covert barriers within women's higher education. She argues that women had little power within educational establishments because almost all lecturers, governors and sponsors of universities were male. Maxine Berg has shown that at the London School of Economics (L.S.E.) however, women accounted for a significant proportion of the lecturing staff,<sup>76</sup> and it will also be shown later that a large percentage of U.C.L.'s science graduates went on to pursue careers in lecturing after graduation. This seems to support the comment made by Purvis, that the entry of women into university education in the late nineteenth century meant that gradually they could compete with men more successfully in later professional life.<sup>77</sup> Fitch in 1890 suggested that a result of university education for women was that the range of occupations which they could enter had broadened beyond school teaching to include medicine, post-office work and decorative art.<sup>78</sup> However, the L.S.E. had a larger proportion of female staff than other British universities, and although it was an interesting example of significant achievement by educated women it was not necessarily 'typical'. Dyhouse comments that the reality was that:

'Higher education altered the outlook of a small number of middle-class women, but the lifestyles of the majority registered little change.'<sup>79</sup>

There is certainly a difference of opinion regarding the extent to which university education affected the future work prospects of women. This has resulted partly from a lack of case studies which trace the later activities of women graduates, a deficiency which chapter five will begin to remedy. In addition, it should not be assumed that if some women did not enter careers after graduation, their study at college was worthless. The fact that these women had spent at least three years studying, perhaps residing in a women's college, developing their knowledge and forming important friendships meant that they had broadened their experience beyond that of many other women from similar socio-economic backgrounds in ways likely to affect their future lives.

The criticism that higher education for women had a tendency to be non-vocational or non-liberating is based essentially on an appraisal of the women's colleges, and particularly on their founders such as Dorothea Beale of the Cheltenham Ladies College, and later of St. Hilda's college who saw education as a forum for encouraging discipline, Christian values and genteel behaviour in 'young ladies', and not as a means of self expression or liberation.<sup>80</sup> In contrast, Emily Davies who founded Girton College for women at Cambridge, believed wholeheartedly in equal education for men and women. She was one of the first advocates of the opening of degrees to women,<sup>81</sup> and was: 'convinced that they (women) could secure the means of progress in no other way than by taking their place in the system already devised by men'.<sup>82</sup> The means of progress she referred to was the entry to professions by women after graduation. Davies showed no signs of a desire to inspire a leisured lifestyle for women after graduation, and as early as 1863 was campaigning for the entry of women into the medical profession:

'The right to practice as a physician would be valuable as opening the way for useful and remunerative employment to those ladies who do not wish to be governesses or engage in ordinary trades'.<sup>83</sup>

In fact, Howarth and Curthoys show that Dorothea Beale, was the only head of a women's college who opposed examinations and careers for women in the period, and advocated the view that education should be personally developmental, but non vocational.<sup>84</sup> Dyhouse points out that Frances Mary Buss, Miss Beale's contemporary, who pioneered the North London Collegiate School for girls, believed in a much more secular brand of education which was designed to improve the employment prospects of middle class girls.<sup>85</sup> Thus it seems that the image of the women's schools and colleges as restrictive of female opportunities was the exception rather than the rule.

Other writers have associated female schools and women's departments in polytechnics and mechanics institutes with traditional values and low levels of female empowerment because a number of them focused on the importance of a training in domestic science and housekeeping, rather than on accepted academic disciplines.<sup>86</sup> At school level, working-class girls were obliged to study domestic economy from 1878 onwards which led to an increase between 1874 and 1882 in the number of girls studying this subject from 844 to 59,812.<sup>87</sup> The reasons for this policy were diverse. Some elements of the middle-classes felt that working-class mothers, with few domestic skills caused a host of social ailments, not least infant mortality. Thus, calls were made for training in domestic economy from an early age. Others feared a fall in the quality and number of domestic servants, and thus backed a policy of training girls in domestic skills.<sup>88</sup> Interest in domestic science filtered up to higher education establishments, a well known example being the department of household science for women at Kings College, London. Such developments have been interpreted by some feminists as regressive. Others however, have signified that the development of household science as an academic discipline was progressive. This view will be outlined shortly. Sanderson suggests that at university level, out of sixteen institutions, only three produced women who entered industry or business: Girton college, one per cent of its students, Royal Holloway College, 2.6 per cent and the London School

of Economics, thirteen per cent.<sup>89</sup> The implication is that women who attended universities did so either for dilettante reasons and did not wish to carry out paid employment, or used their qualifications in the public sector, and especially in the teaching profession. However, Sanderson offers no definition of 'industry' or 'business', and in addition, a close look at his sources reveals that in seven of his institutions, no pertinent data appears to have been available, or no research was carried out for the period 1870-1914. Therefore, his conclusion that women rarely entered industrial or business careers after their education is based on rather flimsy evidence.<sup>90</sup>

Nancy Blakestad has argued that there is a danger of separating women who advocated the reform of household science education, from feminists. Many writers have been criticised for assuming that nineteenth century feminism concerned only those campaigning for equal rights with men, overlooking those who believed in the difference between men and women, and attempted to build upon that distinction.<sup>91</sup>

'The crucial point ... is that it was not merely a matter of women participating in male politics, but women infusing new perspectives on what the concerns of politics could be.'<sup>92</sup>

Here, she refers specifically to the advances made in the household science movement, where both male and female reformers advocated the extension of this subject into the 'public sphere', giving it new importance and credibility as a scientific discipline, which incorporated the fields of economics, sanitation, psychology, ethics and bacteriology. Lynn Gordon has argued, on this basis, that a notion of 'separate spheres' in late nineteenth century Britain is too simplistic, and that: 'in practice... the lives of Victorian men and women resembled over-lapping circles more than separate realms'. This was shown not only in education, but also in women's public activities over issues such as moral reform and the abolition of slavery and in their contribution to missionary work. In educational terms she refers to a

‘progressive era’ in which there was a growth of ‘womens subjects’ such as sociology, sanitary science and home economics. The new approach was to highlight female distinctiveness and moral superiority rather than equality based on a male agenda.<sup>93</sup> The development of the household science department at London University in the early twentieth century, which later became the Kings College of Household Science in 1928, added prestige to this growing philosophy and practice.<sup>94</sup> It is inadequate to suggest that the development of household subjects merely suppressed women, and forced them to operate within a patriarchal framework. In contrast, given that so many women spent such a large proportion of their lives carrying out domestic duties, this movement encouraged public recognition of their skills and roles.

However, there was a danger that, post-education, women who had been educated in domestic science would again be assigned to domestic careers, low pay and exploitation, fuelling, in the long run, the traditional preferences of society and the economy. This was not necessarily the case for women who had received a higher education in this field, as shown by the emergence of a number of new professions in the late nineteenth and early twentieth centuries in response to the existence of groups of women trained in new and specialised areas. In 1893, the first female factory and sanitary inspectors and industrial welfare workers were appointed by Asquith, then Home Secretary, as part of the Factory Department. This placed women firmly in the ‘public sphere’ of government work, alongside male factory inspectors. The first two female inspectors were May Abraham, who in 1895 became superintending inspector of a newly created ‘women’s section’ of the factory department, and Mary Muirhead Paterson. The ‘women’s section’ was developed entirely on the initiative of the first women inspectors, to give them greater independence and power. Needless to say, in its early stages, the scheme attracted much male opposition.<sup>95</sup>

In addition firms such as Levers at Port Sunlight, Cadburys at Bournville and Rowntrees at York, which became famous for their 'benevolent' work appointed company welfare officers. Rowntrees, as early as 1896, employed a professional welfare worker, Miss Mary Wood, and by 1904 had seven social workers on its payroll and in 1906, Hudson Scott, a leading tin box manufacturer appointed a 'lady welfare worker' Eleanor Kelly.<sup>96</sup> In 1913, the Welfare Workers Association, later the Institute of Personnel Management, was founded, giving professional status to this new female occupation.<sup>97</sup> The view that household and sanitary science and other 'women's' subjects such as sociology subordinated women is therefore questionable, and given that Sanderson recognises the growth of industrial welfare as a female profession, his definition of 'industrial work' as something which was rarely carried out by women is rather narrow.

The household science movement is criticised not just for its philosophy, but because it is thought that women were 'forced' into this style of education. However, many women avoided such subjects and aimed where they could, to follow alternative, or even 'traditionally male' options. This does not mean that they defined equality as participation in the 'male world', but that they wished to choose for themselves what educational and future career paths they might take. Mary Creese offers evidence that women did not always follow 'gendered' subjects, and succeeded in entering the supposedly male field of science and research, often gaining prestigious positions. She demonstrates that there were a number of women researchers who authored or co-authored one or more scientific articles in the late nineteenth and early twentieth centuries, who originated primarily from Cambridge, University College London, the Royal College of Science, (which later became Imperial College), Leeds and Bristol. She shows that, contrary to popular opinion, women made a significant contribution to scientific research:

‘The university trained women who, from about 1880 onwards, authored or co-authored an increasing number of original research contributions have been largely ignored, and their names are, for the most part, omitted from biographical reference works and science histories.’<sup>98</sup>

Between 1800 and 1900 twenty four women published 118 geology papers, an average of nearly five each, sixty seven women authored or co-authored 230 botany papers, over three each, and thirty three women published ninety six articles in the chemical sciences, again, around three each. Creese indicates that in each case, the majority of papers were published in the last two decades of the nineteenth century as there emerged a new group of women with formal university training.<sup>99</sup> This is particularly well emphasised in her study of women researchers in the chemical sciences, where she shows that in more than a century between 1800 and 1906 women published 178 articles, but that in the four years from 1907 to 1910 they published a further 149.<sup>100</sup> It certainly appears, from her evidence, that university education opened up new possibilities for women in the field of scientific research. Some of these women held academic positions. Others however had to research outside the traditional framework of the university department because of the difficulty faced in securing posts or gaining promotion. Such women often undertook substantial periods of unpaid work, in order to gain later entry to the competitive field of research and academia. Not all succeeded in gaining paid positions, but many successfully researched and published articles privately.<sup>101</sup> This should not lead to an undervaluing of their work. As Mary & Thomas Creese argue:

‘Rigorous application and intensity of commitment, qualities that characterise ‘professional’ research, need not always be associated with the holding of a full-time paid position’.<sup>102</sup>

The role of co-educational colleges and universities in offering this new range of options for women has rarely been studied, with the main criticisms of female education being aimed at the women’s colleges.<sup>103</sup> The following two chapters consider in detail women’s participation at two institutions which offered education to both men and women from 1878

in the case of U.C.L. and 1888 the polytechnic, and establish whether there were barriers to women within these establishments, and if so, how women overcame these obstacles, if at all. Particular priority will be given to women who studied scientific, technical and vocational subjects given that so little has been written on their contribution in these areas, and that we are essentially interested in the extent to which women used their qualifications for later vocational gain. The first study is of women who attended U.C.L. in the period 1873-1913.



## NOTES TO CHAPTER TWO

1. B Caine (1992), p. 239.
2. Ibid.
3. J A Banks (1954), p. 3.
4. G F McCleary, The Maternity and Child Welfare Movement (1935), p. 5, cited in C Dyhouse (1981a), p. 73.
5. M Anderson (1993), p.35.
6. J A Banks, op.cit, pp. 4-6.
7. D E Baines (1981), pp. 146-7.
8. M Anderson, op.cit, p. 28.
9. M Anderson, op cit, p. 39.
10. J N Burstyn (1980), p. 120; J Howarth and M Curthoys (1987), p. 215; S Delamont (1978), p. 139.
11. See for example the Englishwoman's Yearbook, 1881-1916, the Journal of the Women's Education Union, 1873-1881, the Englishwoman's Review, 1870-1910 and pamphlets by M Bateson (1895), C Collet (1890 and 1902) and E Morley (1914).
12. Englishwoman's Yearbook (1900), p. 46.
13. C Dyhouse (1978a), p. 177.
14. Ibid.
15. J Purvis (1981), pp. 228-9.
16. Ibid.
17. J Purvis (1981), pp. 229-30.
18. C Dyhouse (1976), p. 43.
19. C Dyhouse (1981), p. 153.
20. Ibid, p. 44.
21. Ibid, p. 45.
22. B L Hutchins (1913), p.257 and pp. 259-62.
23. L D Gordon (1990) pp. 18-19.
24. C Dyhouse (1976), p. 45; J G Fitch (1890), p. 252.
25. G W Evans, op cit, p. 22.

26. J N Burstyn, op.cit, pp. 134-5.
27. E. Bird (1991), p. 183.
28. J Purvis (1991), pp. 36-58.
29. Ibid, p. 99.
30. J Bourke (1994), p. 185.
31. Ibid, pp. 68-70.
32. P Phillips (1990), p. 228.
33. J Purvis (1981), p. 232 and J Purvis (1991), p. 42.
34. J Purvis (1981), p. 234.
35. P Phillips, op.cit, pp. 230-1.
36. M Argles (1964), p. 35.
37. J Purvis (1991), pp. 54-5.
38. E Bird, op.cit, pp. 191-4.
39. J Bourke, op.cit, pp. 68-70.
40. G Carnaffon (1988), pp. 68-78 and p. 82.
41. Journal of the Women's Education Union (1880), pp. 98-100.
42. E J Morley (1914), p. 282.
43. P Thane (1992), pp. 305-8.
44. J Purvis (1981), pp. 238-9.
45. Ibid, p. 239.
46. J Purvis (1991), pp. 45-7.
47. P Phillips op.cit, pp. 216-9.
48. N A Jepson (1973), pp. 43-4.
49. M Alic (1986), pp. 178-81.
50. Englishwoman's Review (1903), p.121.
51. J Purvis (1991), p. 115.
52. J Senders Pedersen (1979), pp. 71-9.
53. M Gurney (1872), p. 5.
54. Ibid, pp. 6-7.

55. Dame K Anderson (1963), pp. 5-6.
56. J Purvis, (1991), pp. 106-7.
57. J Senders Pedersen, op.cit, p.72.
58. J Howarth and M Curthoys, op.cit, p. 209 and p. 213.
59. L D Gordon, op.cit, pp. 17-18.
60. C Dyhouse (1987), p. 22.
61. T Kelly (1962), p. 227.
62. N A Jepson (1973), pp. 43-4, pp. 104-5 and p. 108.
63. P Phillips, op.cit, p. 222.
64. J G Fitch (1890), pp. 246-7.
65. See for example; A Zimmern (1898), pp. 433-9.
66. C Dyhouse (1995), pp. 4-5 and p.8.
67. Journal of the Women's Education Union (1873) pp. 68-71, pp. 103-5 and pp. 131-4.
68. Ibid, p. 105.
69. C Kendall (1991), pp. 202-3.
70. A Rogers (1938), pp. 110-11.
71. C Dyhouse (1978 b), p. 298; M Vicinus (1982), p. 603.
72. S Delamont (1978), pp. 140-51; M Vicinus (1982), p. 607; (1985), p. 134.
73. J Gibert (1994), p. 405 and pp. 409-10.
74. J B Thomas (1978), pp. 245-6.
75. J Purvis (1991), p. 116; N Harte (1979), p. 21. For a full account of the barriers faced by women at Cambridge see R McWilliams-Tullberg (1975), especially chapters 5 and 6.
76. M Berg (1992), p. 318.
77. J Purvis (1991), p. 120.
78. J G Fitch (1890), p. 240.
79. C Dyhouse (1984), p. 62.
80. C Dyhouse (1984), p. 58.
81. E Davies (1910), p. 62.

82. B Stephen (1927), p. 156.
83. E Davies, op.cit, p. 61.
84. J Howarth and M Curthoys, op.cit, p. 229.
85. C Dyhouse (1987), p. 28.
86. W G Evans op.cit, p. 24; E Bird, op.cit, pp. 191-4.
87. C Dyhouse (1976), p. 48; (1977), p. 21.
88. C Dyhouse (1977), pp. 21-8; (1978 b), pp. 300-1.
89. M Sanderson, op.cit, pp. 330-1.
90. Ibid, pp. 330-1, See Sanderson's footnotes.
91. N Blakestad (1992), p. 4 and pp.10-11.
92. Ibid, p. 13.
93. L D Gordon, op.cit, p. 14 and pp. 33-8.
94. N Blakestad, op.cit, pp. 3-4 and pp. 17-9.
95. M D McFeely (1988), p. 4, p. 14 and pp. 44-6.
96. S D Chapman (1974), p. 168; W J Reader (1976), p. 29.
97. M Sanderson, op.cit, p. 316.
98. M Creese (1991), p. 275. For a complete account of the names and publications of women researchers in the chemical sciences, see full article, pp. 275-305. See also M Creese and T Creese (1994), appendix 1, pp. 49-55 for a list of women who published at least one article in geology.
99. M Creese and T Creese, op.cit, p. 24; M Creese, op.cit, p. 278.
100. M Creese, op.cit, pp. 301-5.
101. Ibid, p. 286 and p. 295.
102. M Creese and T Creese (1994), p. 41.
103. Carol Dyhouse's recent book, No Distinction of Sex? Women in British Universities, 1870-1939, has done much to redress this balance and offers a comprehensive insight into women's experiences as students, academics and members of social societies in British universities between 1870 and the outbreak of the Second World War. See C Dyhouse (1995).

## CHAPTER THREE      SCIENTIFIC EDUCATION FOR WOMEN AT UNIVERSITY COLLEGE LONDON, 1873-1913

### SOURCES AND METHOD OF RESEARCH

The data for this study was located primarily in the Records Office of U.C.L. and the college's manuscripts room. The Records Office housed both published and unpublished material. The published sources were in the form of college calendars for each academic year, which gave details of subjects offered, course content, numbers of students and graduates, and for the period 1900-1913, details of the course upon which each student was enrolled. Additionally, there were volumes of extracts from council minutes and annual reports. The main sources of unpublished material were the college fees books which consisted of individual records of each course upon which a student registered, bound by year and faculty. Each entry gave details of course cost, student's address and in some cases, age. In addition there were numerous faculty minute books, and professors' fees books which were bound volumes of course registers. For the period 1873-1881, these were located in the manuscripts room.

Most of the information used for this study was extracted from the college calendars, which provided the basis for a quantitative study of women attending U.C.L. In each calendar there was a section headed 'Students of University College London', which listed all those enrolled at U.C.L., whether studying single courses or attending as undergraduates. Some were also studying for college certificates. These were awarded to any student who had attended five terms of consecutive study, and had successfully passed.<sup>1</sup> The students were listed by name for each year either by their surname and an initial or by their full first and second names. Almost all that were listed by full name were women, thus the decision was made to regard all the initials as male students. This, of course, possibly underestimated the

number of women, because it was conceivable that some of these initials disguised female names. The extent to which this was the case was investigated by double-checking with the professors' fees books. These were handwritten course registers which normally presented student names in full. Therefore, by counting all the female names that occurred and comparing them with those in the calendars, any discrepancies could be located. A sample period 1873-1881 was chosen, as this process was too time consuming to complete a comprehensive survey, and the fees books for chemistry were used. Only on one occasion did a discrepancy occur. In the academic year 1878-79 a student was listed as Pamela Purnell in the professors' fees book and as P Purnell in the college calendar. This demonstrated that the method of presentation used by the calendars tended to underestimate the presence of women, although it also emphasised the general reliability of the calendars as a source, given that student numbers were very large for each academic year. Nevertheless, the following rates of female participation should be regarded as minima. A second problem was that there were some unusual or non-specific first names, which could have been interpreted as either male or female. These were rare, but where there was any uncertainty, the student was considered to be male. As with the previous method, the only fault was a possible underestimation of female figures, and therefore the credibility of the argument proposed is not damaged. There is no question of an overestimation of the rate of female participation at U.C.L.

From 1900 onwards, the calendars listed, alongside each student name, the department in which that student was enrolled, science, art or fine art. There was no such distinction before 1900, the most precise category being the faculty of arts, science and laws. The only means of discovering which were science students before 1900, would have been to consult the professors' fees books and count the names of every student enrolled on each science option. The problem here was largely one of time. As there was no index to these

professors' fees books, and given that many student names reappeared over more than one academic year and also on various courses, multiple counting was almost unavoidable, given that student numbers were in the hundreds for each academic year. The years covered in the study of women science students are therefore 1900 to 1913 when the calendars provide a clear indication of the number of students who were studying science subjects.

A further heading which appeared in the calendars was 'Graduates of University College London'. The previous 'student' figures included undergraduates but also those who had enrolled for single courses, some out of interest rather than for a qualification, others in order to gain a college certificate and a further group who studied single courses at U.C.L. which would form part of an external University of London degree. The graduate figures thus represent a much smaller group who successfully obtained University of London degrees after a full course of study at U.C.L. These figures are of interest, because they enable an assessment of the number and proportion of women who reached a level of education, in which they are commonly judged to have been poorly represented. Once again the method used was simply to count the overall number of graduates, and then female names for each academic year. Particular attention was paid to the names of female science graduates in order that the final stage of analysis could be carried out.

The female science graduates' names were finally matched against entries in the college fees books, in order to ascertain the specific courses which they studied to gain their BSc degrees. These volumes also gave some useful insights into the cost of a full science degree. The college fees books were different in format from the previously mentioned 'professors' fees books. The former contained a collection of individual student registrations, which were bound by academic year, and placed in order of registration by date, not surname. In contrast, the latter were lists of students on specific courses, as recorded by the lecturer

responsible for that subject. Unfortunately, in the period up to 1885 there was no index accompanying the college fees books. Entries were not in alphabetical order, but merely by date of payment, and there were over one thousand entries per year, of which any one student could be registered for as little as one course or as many as she pleased. Hence it was very difficult to obtain reliable statistics. The results of this study are therefore based on a six year sample period from 1885 to 1891. As course fees changed very little over the forty year period covered by this study, a six year sample is adequate because the fees can be related to any year, and still be meaningful. The results of these research exercises will shortly be discussed. Firstly, a brief outline of the college's development is given, in order to provide a context for understanding the patterns of female education at U.C.L.

## **THE DEVELOPMENT OF FEMALE EDUCATION AT U.C.L.**

University College London first opened in 1828. At this early stage it did not offer the option of degrees, but a range of individual courses, some of which led to college certificates.<sup>2</sup> Degrees were introduced for men in laws, arts and medicine in 1836, and for science in 1858.<sup>3</sup> Although women could not register for degrees until 1878, some attended individual classes at U.C.L. before this. In 1832, two women were registered for a 'juvenile course in natural philosophy', and between 1861 and 1862, 113 women attended a course in 'animal physiology'.<sup>4</sup> These women were not registered as students of University College because the option of official registration with the college was not then open to them. The movement for this right of admission began in 1868 with the formation of the Ladies Educational Association (L.E.A.), an independent organisation which arranged lectures for women, using the facilities of U.C.L. and its lecturers. Although this brought large numbers of female students into the college, these should not be confused with the college's own students, and do not appear in the college records:



‘Unfortunately the students attending the ladies classes do not appear in the college registers, and the exact numbers involved are not yet known, although every indication is that these were large.’<sup>5</sup>

Negley Harte suggests that the influence of the Ladies Educational Association, along with the broader social and intellectual climate such as university extension and the female suffrage movement, combined to explain the gradual decision to open up the college to women in the period 1871-1878.<sup>6</sup> The Slade School of Fine Art, a department of U.C.L., was opened to women in 1871, followed by the course in political economy at the college in 1871-2. This was one of the first courses to be run co-educationally and therefore is something of a landmark in the movement towards equality of education for women and men. Jurisprudence was the next course to open its doors to women in 1873, followed by Roman Law in 1875 and mineralogy and mathematics in 1876.<sup>7</sup> The decision was made in 1878 to permit women to study for degrees,<sup>8</sup> meaning that in theory most remaining courses at the college were opened to them. There were, in practice, still restrictions. For example women were not permitted to take degrees in medicine until 1917,<sup>9</sup> nor were they admitted to the faculty of engineering.<sup>10</sup> Harte believes in contrast, that in the faculties of arts and science they were admitted ‘on the same terms as men’,<sup>11</sup> a view that was shared by contemporary commentators such as C S Bremner who claimed that the University of London’s degrees were open to students of both sexes ‘on terms of perfect equality’.<sup>12</sup> It will be shown later that this was not strictly the case.

The decision to admit women as undergraduates in 1878 meant that the agreement between the L.E.A. and U.C.L. was terminated, the goal of the former having been achieved. A letter of 27th July of that year written by J Mylne of the L.E.A. acknowledged this termination and expressed sincere gratitude to the council for their ‘kind and liberal’

treatment of the L.E.A. Correspondence between the two parties over the previous eight years was of a similarly amiable nature. Mylne in 1878 stated:

‘Owing partly to the excellent arrangements made by the committee of management of the college and chiefly to the gentlemanly feeling of the students themselves no instance is on record of any annoyance caused by a college student to any lady attending classes within its walls.’<sup>13</sup>

She expressed great joy that U.C.L. had permanently been opened to women. At least in the years before 1878, it appears that relations between women reformers and male educationalists were not unnecessarily strained. The decision to allow women to study for degrees in this year earmarked the University of London as a liberal institution, especially when compared to the unfavourable treatment received by women at Oxford and Cambridge.

U.C.L. was not alone however. The developing civic universities of the late nineteenth century admitted women as soon as they gained their charters, and like U.C.L. many of these colleges accommodated female students well before they were admitted to degree courses, due to the perseverance of local L.E.A.’s.<sup>14</sup> It is generally accepted that these ‘new’ universities were progressive in their policies of access, although the extent to which women gained equal treatment within student society in these universities has been disputed.<sup>15</sup> U.C.L. was undoubtedly one of the pioneers of education for men and women up to degree level in Britain, and along with other London colleges set an important precedent. The following sections discuss the implications of the opening of the college to women, and in particular consider the extent to which women became integrated in different areas of the curriculum.

## STUDENTS OF U.C.L.

The number of college students, and the proportion that were female is shown in table 3.1. The figures are presented as an average per annum for five year periods, to enhance the accessibility of the material. Negley Harte has also provided figures for female participation at U.C.L. between 1869 and 1878 which conflict with those offered below.<sup>16</sup> If his data is averaged over the five year period 1873-1878 on a per annum basis, it appears that there were 323 female students at U.C.L. whereas table 3.1 indicates only 114. A closer observation of his source reveals that the students counted are in fact those of the Ladies Educational Association (L.E.A.), and not students of U.C.L. Although these are relevant and important in a study of educational opportunity at U.C.L. they cannot be used to explain changes in women's participation as students either in comparison with men, or with regard to trends after 1878 when the Ladies Educational Association was disbanded. Harte appears to be using these figures to demonstrate that there was a growing number of female students at U.C.L., whereas in fact these women were totally separate from the college's own students.

**Table 3.1. STUDENTS OF U.C.L., 1873-1913. FACULTY OF ARTS, SCIENCE AND LAWS (AVERAGE PER ANNUM)**

Year	Total no. of students	No. of female students	Female students % of total students
1873-1877	528	114	21.5
1878-1882	792	269	34.0
1883-1887	758	237	31.3
1888-1892	627	225	35.9
1893-1897	761	348	45.7
1898-1902	805	371	46.0
1903-1907	966	436	45.1
1908-1913	<u>1263</u>	<u>442</u>	<u>35.0</u>
Average	812	305	36.8

Source : College calendars 1873-1913, U.C.L. Records Office.

It is strange that Harte's figures suggest that, on average, 323 women studied through the L.E.A. in each year between 1873 and 1878 when Table 3.1 shows that only 269 enrolled as students of U.C.L. in the later period 1878-83, when the option of studying for degrees became available. There are no official records of the L.E.A., and therefore it is impossible to know what happened to the extra fifty four female students in 1878. Indeed, this figure may have been even larger if those women who were 'students of U.C.L.' between 1873 and 1878 had not previously been enrolled with the L.E.A. The main explanation for a drop in numbers seems to have been that U.C.L.'s student entry requirements were very stringent, not to mention socially exclusive, and that some women who previously had studied through the L.E.A. simply did not qualify for entry. (Details of U.C.L.'s entry requirements are given on page 87 below).

Table 3.1 is concerned only with students in the faculty of arts, science and laws. Another set of figures appeared in the calendars for the faculty of medicine, but as this was closed to women until 1917 there was little point in analysing student participation. Some significant observations can be made from the data in table 3.1 regarding female involvement however. Firstly, in each quinquennium the proportion of women who studied at U.C.L. was high. Even in the years when courses were gradually being opened to women, 1873-1877, women comprised 21.5 per cent of the total, over one fifth of all college students. Bearing in mind that in contrast to men, women could not yet register as undergraduates, this figure is even more impressive. If the average rate of female participation is recalculated, based on the years 1878-1913 when both men and women had the choice of studying for degrees, women comprised a higher proportion of the total, thirty nine per cent. This level of female involvement in higher education has rarely been commented on in standard accounts, and thus the results are surprising. In general terms, there was a growth in the total number of students at the college from 528 in 1873-78 to 1,263 by 1908-1913. This

growth pattern was matched by the number of female students which rose from 114 to 442 over the same period. Closer analysis shows that during the period 1878-1882 there was a particularly large increase of 263 students, of whom 155 were female. Women therefore accounted for well over half the growth, and comprised thirty four per cent of the student body. This suggests that as courses became available, women were keen to enrol, and it seems that in the period before 1878 female ambitions to gain a higher education were simply not catered for, and that by 1878 there was a good deal of pent up demand.

In the period after 1883, the percentage of female students at the college ranged from a minimum of just over thirty one per cent to a maximum of forty six per cent, nearly half of the student body. Thus at U.C.L. women were a significant group, who should not be awarded marginal status. Whilst overall student numbers were growing in this period, the number of women was rising even faster, explaining why between 1893 and 1907 women comprised such a large percentage of the total. This trend was partly due to U.C.L.'s pioneering qualities and egalitarian policy on female admission. However, as previously outlined, these did not extend to all college courses and faculties. The inclusion of figures for the Slade School in table 3.1, a department which accommodated a large number of women students, certainly accounts for much of this high female rate of participation. Alternatively, an increased female presence at U.C.L. can be explained by a number of external factors. The Education Acts of 1870 to 1902 for example, provided women with new options for their future, and were aided by the introduction of the girls public day schools, which offered a more academic education than existing private schools, and prepared some girls for university.<sup>17</sup> The female suffrage movement also played an increasingly important role, advocating not only the right to vote, but equality for women in many other areas of life. Platforms for women to voice their views were developing in the late nineteenth century, for example the National Union of Women Workers (N.U.W.W.), an organisation which provided a forum for debate, and information through conferences and bulletins, and backed the importance of female education and training. By 1904 it had a total

membership of 3,625 and thirty eight branches.<sup>18</sup> Advice to women, especially with regard to higher education, training and employment was also increasing with the introduction of a number of journals and pamphlets which provided information and encouragement to women in the late nineteenth century.<sup>19</sup> On a more practical note, the fact that the University of London did not have residence regulations<sup>20</sup> meant that women could live with parents or relatives whilst studying. At a time when families were concerned about the negative effects of college life on their daughters, such a policy may have made London more attractive than universities such as Oxford and Cambridge.

For various reasons, the trend at U.C.L. was towards a growing number of female students and an expansion in the female percentage of all students. The only exception was the period 1908-1913, when although the number of women at the college increased, their proportion declined to thirty five per cent. This was due to a dramatic increase in the number of men, rather than any decline in female involvement. The growth of female participation to nearly half of the student body by 1898 was highly significant and very surprising in the light of conventional historiography which suggests that women's role in higher education was marginal prior to the First World War. The temptation is to suggest that U.C.L. was somehow 'atypical'.

The University Grants Committee (U.G.C.) was a body set up in 1919 to co-ordinate the administration of Treasury grants to British universities. Its reports for the period prior to 1919 relied on earlier information supplied by the Board of Education which gave details of full-time students in British Universities. Thus, these U.G.C figures show that in 1900, women accounted for sixteen per cent of the British university population and, by 1910, twenty per cent.<sup>21</sup> This may seem surprising given that contemporary reviews were showing a significant body of women in the new civic universities of the late nineteenth century. In 1886 for example, the Englishwoman's Review claimed that 36.4 per cent of the student population of Mason College, Birmingham was female,<sup>22</sup> and by 1896 this figure

had risen to forty seven per cent.<sup>23</sup> In 1905 twenty seven per cent of students of arts, science and law at Manchester were women.<sup>24</sup> Women's position at Manchester had not always been this strong however. After 1882, when they could first enter for degrees of the Victoria university their numbers were small, in particular because accommodation and facilities for women were poor. It was not until 1892 and the introduction of a day training college for women who wished to gain teacher training that their numbers grew. All these women were taking degree courses. This should stand as evidence against the view that trainee teachers were somehow not as 'academic' as other students. Only one third of Manchester women were training to be teachers between 1899 and 1914 however, the majority were studying for honours degrees, and women came to outnumber men in the faculty of arts and also in subjects such as botany and zoology.<sup>25</sup> Bremner shows that at Nottingham University College and Bristol College, women also comprised virtually equal numbers with men before the First World War.<sup>26</sup> More recently, Julie Gibert has suggested that on average women comprised approximately one quarter to one third of students at the civic universities in general between their opening and 1914.<sup>27</sup> U.C.L., it seems, may have led the way, but did not stand alone in offering the opportunity of a higher education to a large number of women.

An explanation for the much lower percentage of female university students presented by the U.G.C. for the years before 1914 can be found partly in the fact that these figures included all British universities in receipt of university grants, some of which were far less receptive to women students than the new civic universities. However, Oxford and Cambridge, two institutions which might have been expected to pull the average down, were not included, and thus alone, this does not seem a sufficient explanation for the female average of only sixteen per cent. The most realistic explanation is that the published U.G.C. report for 1936 which provides retrospective information to 1900, offers details only of full-time students in British universities and gives no account of the significance of men and women as part-time students.<sup>28</sup> A study of the Board of Education returns from university colleges for 1900

showed that women often studied on a part-time basis. For example, at Bristol thirty eight full-time students were female, compared to fifty nine male in the faculty of arts and science, whereas 146 men and 167 women were registered as part-time students.<sup>29</sup> Similarly at University College, Dundee, women comprised only twenty two per cent of day students, but just over fifty per cent of evening students.<sup>30</sup> At a time when not only the London colleges, but also the civic universities were preparing students for external University of London degrees, a large number of part-time students was not unusual, because affiliation to one particular institution was not a requirement to sit degree examinations. Indeed a number of individuals gained external University of London degrees who had been educated entirely at home, among whom women numbered highly.<sup>31</sup> A calculation of only full-time students necessarily obscures such individuals, and implies that female participation was lower than, in reality, it was.

This can be supported by the findings from U.C.L.'s calendars, which showed that between 1898 and 1902, 371 women per annum enrolled as students. This compares unfavourably with the U.G.C. figures of full-time students at U.C.L. in the academic year 1900-1901, which claimed that 167 were female.<sup>32</sup> The discrepancy can probably not wholly be accounted for by part-time students, but rather by a large number of 'floating' students who enrolled at U.C.L. for single courses, possibly due to specific interest in that subject, or as part of a mixed programme of home study and single course tuition at a number of different universities which would enable them to submit for a University of London external degree. The proportion of full-time students at U.C.L. who were female in the two years 1900 and 1910 was, according to the U.G.C. figures, just under twenty nine per cent. This is a considerably lower figure than that presented in table 3.1 which includes part-time students. It certainly seems that national statistics of full-time university students before the First World War undervalue the role played by women in British universities and that more



detailed case studies of individual institutions are needed to gain a clear impression of female participation across the country.

It is worth mentioning that the way in which the college calendars presented information on students of the college, as shown in table 3.1, may distort our impression of female participation. In 1910 the calendars began categorising students more precisely, detailing not only the faculties in which they were enrolled, but also the subjects which they were studying. Those who had previously been defined only as students in the faculty of arts, science and laws, were now specified by broad subject areas such as arts, fine arts, science, engineering and laws. It is thus possible from this date onwards, to establish the areas of the curriculum in which women participated. It will be noticed that the Slade School of Fine Arts housed a very large percentage of female students. The academic year 1910-11 is given below as an example.

**Table 3.2. STUDENTS OF U.C.L. BY SUBJECT, 1910-1911**

<b>Subject</b>	<b>Total no. of students</b>	<b>No. of female students</b>	<b>Female students as % of total students</b>
Arts	434	186	43.1
Fine Arts	253	189	74.1
Science	197	50	25.4
Engineering	133	0	-
Laws	43	0	-

Source : College calendar 1910-11, U.C.L. Records Office.

It has already been shown that women were barred from studying engineering, which is confirmed in table 3.2. In addition, no women were present in the department of laws in any year between 1910 and 1914. Students had been reading engineering at U.C.L. since 1879, but prior to 1910 could not be isolated in the general faculty figures. If it were possible to exclude all engineering students from table 3.1, a reasonable course of action given that

women could not choose to study in this field, the proportion of total students who were female would have been even higher than this table suggests.

A report written by Henry Morley in 1878 on the admission of women to college classes indicated that their absorption into mainstream lectures was to be a gradual process. Some subjects immediately admitted women to mixed lectures in 1878 whilst others held back, choosing either to run a separate class for women, or to keep the option available only to men. This exposes a weakness in the view that in 1878 women gained equal treatment in all faculties other than medicine and engineering. However, according to Morley's report, women were to be admitted to mixed law lectures from 1878,<sup>33</sup> so it does not appear that women's non-participation in law subjects by 1910-11 was a result of discriminatory college policy. It is surprising however, that not one woman was recorded as having studied law between 1910 and 1914, unusual, even for a course which was not in high demand. The most probable explanation is that women consciously chose not to study law because employment opportunities in this area were so slim. Women were barred from the Law Society before 1918 for example,<sup>34</sup> and the first woman was not called to the bar until 1921.<sup>35</sup> Howarth and Curthoys echo this view suggesting that the dearth of professional opportunities for women in law and engineering was the cause of their non-participation in these subject areas at Oxbridge.<sup>36</sup> The inclusion of student figures for a department in which women did not participate because they were effectively barred from practising their profession once qualified, has the effect of pulling women's overall participation rates down. In subjects where there were no formal restrictions and reasonable career opportunities, women enrolled in large numbers.

In the department of science where women were allegedly admitted on the same terms as men,<sup>37</sup> there were a wide range of restrictions. Table 3.3 shows the availability of science options to women, and gives some indication of courses that were only available to men.

The column 'year in which course totally opened to women' is based on information obtained from the college calendars. Each course was detailed in the calendars and followed by bracketed information confirming whether it was a male or female option. For example, in 1879 the full course in chemistry had a list of component options which were almost all followed by the signal (MEN), and just one option labelled 'elementary chemistry' (WOMEN). In this case the year 1879, for chemistry, was recorded under the heading 'restricted options opened to women'. Table 3.3 shows that although women could enrol for a BSc from 1878, a number of science options were still closed to them. This was also confirmed by Morley's study.<sup>38</sup> Zoology, for example was exclusive to men until 1885, botany until 1886, chemistry until 1888 and physiology until 1904. All these courses were available to men from 1879. This both refutes the conventional belief that women and men were admitted on equal terms to the faculty of arts, science and laws after 1878, and highlights that the female proportion of total students observed in table 3.1 was quite remarkable, given the greater struggle that women faced when attempting to study science subjects compared to men.

Although there may have been reasons for running an elementary option in chemistry for women, namely that many had not had the benefit of a full secondary education before entering university, this does not explain the closure of advanced chemistry options to those women who may have been qualified to take them. Mary Adamson, a BSc student at U.C.L. recorded the obstacles that she faced when attempting to gain her science education.<sup>39</sup> After studying the first year of her physiology and physics degree at Bedford College in the early 1880s she was transferred to U.C.L. because Bedford College could not provide her with a second year of teaching. She was informed however that it was inconceivable that she should follow a physiology degree and was also barred from studying chemistry because it was totally inappropriate for women to work with dangerous chemicals. The year was 1884. She had to change the path of her degree to botany and physics. Frustrating as this must have

been, she was fortunate even to be admitted to botany classes, which were not officially opened to women until 1886.

**Table 3.3 COURSES OFFERED AT U.C.L. IN THE DEPARTMENT OF SCIENCE, AND THEIR AVAILABILITY TO WOMEN, 1879\*-1913**

Course Name and Year in which introduced	Year in which some restricted options opened to women	Year in which course totally opened to women
1879 Maths	1879	1880
Applied Maths/ Mechanics		1879
Physics		1879
Chemistry	1879	1888
Chemical Technology (dropped 1895)		1879
Geology/Mineralogy		1879
Botany	1879	1886
Zoology/Comparative Anatomy	1879	1885
Physiology	1888	1904
Hygiene and Public Health (dropped 1881)		1879 (women only course)
Engineering and Mechanical Technology		
1881 Physiology and Hygiene (dropped 1885)		1881
1883 Civil Engineering/ Surveying		
1886 Electrical Technology (dropped 1894)		1886
1894 Mechanical Engineering Electrical Engineering		
1898 Pathology & Morbid Anatomy (dropped 1904)	1901	
Pathological Chemistry		1898
1901 Municipal Engineering		
1903 Physical Geography and Mineralogy		1903
1911 Applied Statistics		1911
1912 Military Science		1912
Physical Anthropology		1912
Heating and Ventilating Engineering		
Graphics (Engineering)		

\* 1879 is the date of commencement because up until 1878 many courses were not open to women. 1879 is the first year in which female names appear on the course lists, covering the academic year 1878-9.

**Source :** College calendars 1878-1913, U.C.L. Records Office.

Although Dr Oliver the botany professor was not prepared to admit her to his classes, the sub-professor, Mr Scott was, and thus she gained relatively early entry to this subject. The treatment that she and a fellow student, Helen Wilson received was mixed. Adamson outlined the rules regarding their admission to mixed classes in physics and botany. Women had to enter the physics lecture by a separate door from the men and sit well away from them, on the back row of the lecture theatre, and in botany women had to sit at a separate table, with their backs facing the men and the lecture theatre. Bremner's account of co-education at U.C.L. creating an environment in which women and men sat 'cheek by jowl' does not appear to have been strictly the case.<sup>40</sup> Carey Foster, the physics professor was more receptive. He invited women and men to his garden parties and, Adamson stated that women were: 'not considered at all dangerous'!<sup>41</sup> In most arts subjects, women gained immediate admission in 1878, although in Greek, English and modern languages many of their classes were not shared with men, and in architecture the main classes were restricted to men whilst women could only study the fine art component.<sup>42</sup>

Thus, although women were attracted to U.C.L. because it was more egalitarian than most other established universities, it would be wrong to suggest that they gained total equality once there. Given the number of restrictions which women still faced in engineering, medicine and science and to a lesser degree in the arts, their levels of participation were impressive and signify that women such as Mary Adamson did not simply 'give up' when the route to securing a higher education was tortuous. In absolute terms, female students at U.C.L. increased four times in number between 1873 and 1913, and on average they represented a high proportion of all students at the college, rising to a peak of forty six per cent in 1898-1903. This undermines, at least with reference to U.C.L., any notion that women's participation in higher education was low. The following section considers in a little more detail those who were studying in the department of science.

## SCIENCE STUDENTS OF U.C.L.

Figures for the number of science students at the college are given in table 3.4 below. This information was recorded in the college calendars from 1900 onwards, thus the period covered is only thirteen years and for this reason it was feasible to provide a separate entry for each academic year.

**Table 3.4 STUDENTS OF SCIENCE AT U.C.L., 1900-1913**

Year	Total no. of students	No. of female students	Female students as % of total students
1900-1901	129	35	27.1
1901-1902	129	43	33.3
1902-1903	183	54	29.5
1903-1904	169	42	24.8
1904-1905	227	60	26.4
1905-1906	228	76	33.3
1906-1907	190	57	30.0
1907-1908	250	82	32.8
1908-1909	256	89	34.8
1909-1910	223	69	30.9
1910-1911	197	50	25.4
1911-1912	310	135	43.5
1912-1913	<u>182</u>	<u>35</u>	<u>19.2</u>
<b>Average</b>	206	64	30.1

**Source:** College calendars 1900-1913, U.C.L. Records Office.

Women accounted for over thirty per cent of total science students between 1900 and 1913, a lower figure than their percentage of the total student body, but nevertheless a significant rate of participation. Ignoring the last three years for the moment, the proportion of women was remarkably consistent across the period. The range was between 24.8 per cent in 1903-1904 and 34.8 per cent in 1908-1909. With the one exception of 33.3 per cent in 1901-1902, the female percentage can be divided roughly into two periods, 1900-1905 when it was in the high twenties, over a quarter of science students at U.C.L., and 1905-1910 when it

was in the low to mid thirties, roughly one third of all students. Therefore there was a gradual trend rise. It appears that the percentage of female science students at U.C.L. was significantly higher than historians have assumed. Few studies have broken down the subject areas which women studied whilst at university, so it is difficult to establish whether U.C.L.'s high proportion of female science students was unusual. The Englishwoman's Review of 1909 showed that only just over five per cent of science students at Edinburgh were female.<sup>43</sup> Lindy Moore and Sheila Hamilton have given more recent figures which appear to bear this out.<sup>44</sup> However, Moore also claims that of the Scottish universities, Edinburgh was unusual in having such a low level of female representation. Another section of the Englishwoman's Review for 1909 showed that at Manchester, twenty three per cent of science graduates were women.<sup>45</sup> This strengthens the view that at the civic universities, opportunities were good and that a tendency to focus on the older, established universities, where women often had to struggle more to gain an equal footing, has given an inadequate impression of the extent of female involvement in higher education, especially in the sciences. The situation at Manchester had not always been favourable however. Tylecote shows that there were still many science options which were closed to women up to 1890.<sup>46</sup>

The U.C.L. figures for 1910-1913 require some further analysis because they are so wayward. They can be explained largely by the fact that in 1910 the calendar began recording engineering students separately, thereby removing them from the 'science' figures under which they were previously listed. Not surprisingly this led to an initial fall in the number of science students in 1910-1911, although not enough to account for the 133 engineering students who were listed separately in this year. It can only be assumed that the prestige attached to a new faculty of engineering and specific engineering degrees led to a rise in numbers. The surprising fact is that the female percentage of 'science' students did not rise as the engineering faculty, closed to them, began to attract men. In contrast the

actual number of female students declined to its lowest point in six years, bringing about a decline in percentage share to 25.4 per cent.

In contrast, 1911-12 witnessed an enormous surge of both overall and female numbers and an increased female share of 43.5 per cent of all science students. The percentage share held by women would be expected to rise if men were moving into engineering, but the enormous numerical leap to 135 female students is much more surprising, as is the increase in students in general. Three new science courses were introduced between 1911 and 1912, the first for eight years, applied statistics, military science, and physical anthropology which may go some way towards explaining a significant increase of both total and female numbers in this academic year. However the tiny percentage share held by women and the significant fall in student numbers of 1912-13 are virtually impossible to explain. This was too early for the preparations for war to be significantly affecting student numbers, particularly female participation, and no science courses were closed in this period. Nor was there a substantial shift to any other area of study such as medicine, laws or arts within the college.

Irrespective of the problems of annual fluctuations however, the overwhelming impression gained from table 3.4 is that women comprised a surprisingly high percentage of science students on average, especially given the conventional image that science and technology were areas to which women were rarely attracted.<sup>47</sup> Their presence in quite high numbers in this department meant that in theory women were gaining valuable skills which had the potential of being of use to the wider economy. Chapter five assesses the extent to which some of these women, those who graduated with science degrees, were successful in using their qualifications in the labour market. The following section which considers women's participation as graduates, is of fundamental importance to this thesis because degree study was an area of education in which it was often difficult for women to gain a foothold.



## GRADUATES OF U.C.L.

Figures of U.C.L. graduates were again gleaned from the college calendars, and were listed under various headings. These were Bachelor of Medicine and Bachelor of Surgery which were later merged, Bachelor of Laws, Bachelor of Science, which branched out to include BScs in economics and engineering and Bachelor of Arts. Only those who gained the Bachelor of Science and Bachelor of Arts are detailed in this study, because degrees in medicine and surgery and the BSc in engineering were not open to women, and no women studied law before 1914. Table 3.5, gives details of these arts and science graduates from 1880 to 1913. The figures commence in 1880 because this was the first year in which women appeared as graduates having enrolled as students in 1878. The figures are averaged per annum over quinquennia with the exception of the last entry, 1910-1913 which represents only a four year period. The results for BSc economics are not presented in the table, but are discussed later.

**Table 3.5. GRADUATES OF U.C.L., 1880-1913, BA AND BSC (AVERAGE PER ANNUM)**

Year	BA			BSc		
	Total graduates	Female graduates	Female % of total graduates	Total graduates	Female graduates	Female % of total graduates
1880-84	19	3	15.8	8	1	12.5
1885-89	17	5	29.4	11	3	27.3
1890-94	11	5	45.4	11	3	27.3
1895-99	7	3	42.8	10	3	30.0
1900-04	11	6	54.5	15	4	26.6
1905-09	24	14	58.3	31	9	29.0
1910-13	<u>31</u>	<u>14</u>	<u>45.2</u>	<u>31</u>	<u>9</u>	<u>29.0</u>
Average	17	7	41.2	17	5	26.9

**Source:** College calendars 1880-1913, U.C.L. Records Office.

Between 1880 and 1899 there was a steady decline in the number of arts graduates from nineteen to seven. In contrast, over the same period, with the exception of a small fluctuation between 1895 and 1899, the number of female arts graduates grew. Thereafter the total number of arts graduates increased to 1913, but the female rate rose faster, causing women's proportional significance to increase rapidly, so much so, that between 1900 and 1909, women comprised the majority of all arts graduates at U.C.L., reaching a peak between 1905 and 1909 of 58.3 per cent. Even though this dominance was in the arts, an area traditionally believed to have attracted women more than other areas of the curriculum, very little historical research has suggested that women ever exceeded men numerically in higher education, and particularly not at degree level. This is in spite of contemporary findings such as those of the Englishwoman's Review which showed in 1909 that forty four per cent of arts students at Edinburgh were female, and that at Manchester women accounted for the majority of all arts graduates, fifty eight per cent, a strikingly similar percentage to that of U.C.L.<sup>48</sup>

The overall increase in graduates between 1900 and 1913 should be explained. From the 1880s there had been calls for the University of London to become a teaching institution and not just an examining body. This led in 1898 to a closer bond between U.C.L. and the University, where U.C.L.'s lecturers had the right to be represented on university committees and boards of studies in an attempt to bring teaching and examining functions closer together.<sup>49</sup> It was also decided that if a student was to be awarded an 'internal' as opposed to an 'external' University of London degree they had to complete their full course of study at a recognised college such as U.C.L.<sup>50</sup> Previously students could carry out part of their study at U.C.L., part at another college or at home and then submit for a University of London degree. Such students were not recorded as 'graduates' of U.C.L. The college was finally fully incorporated with the University of London in the 1905 University College

(transfer) Act, from which point it ceased to have a separate legal existence. The result, was that the number of internal graduates who had qualified through U.C.L. increased. In contrast, the decrease in overall numbers between 1880 and 1889 resulted from the fact the most students who attended U.C.L. during this period did not do so on a full-time basis, and thus entered for external degrees through the University of London, for which U.C.L. received little credit. It can also be explained by the development of the civic universities. With the exception of Owens College, Manchester which opened in the 1850s, the other new universities sprang up in the late 1870s and 1880s. University College, Bristol was founded in 1876, Firth College, Sheffield in 1879, with the addition of a technical school in 1886 and Mason College, Birmingham in 1880.<sup>51</sup>

David Jones states that by the 1880s increasing numbers of women were beginning to enter higher education in the provinces, although he does not indicate the extent to which this was in science and technology.<sup>52</sup> This development opened an opportunity for people both male and female to enter higher education locally at their convenience rather than having to travel to London to do so. Although the majority of U.C.L.'s students were drawn from London, some originated from other areas. A small sample of fourteen female chemistry students taken between 1879 and 1881 showed that two women came from Belfast and Reading to study at U.C.L., and another from Chichester. A further three travelled from overseas dominion territories. This shows that in the period up until the 1880s a number of women were travelling to U.C.L. to study, and therefore it is conceivable that during the two decades in which the provincial universities were developing, U.C.L. may have lost some of its potential graduates. A contemporary pamphlet, which compared opportunities for women at all British universities, showed that a number of the provincial universities offered much higher numbers of entrance scholarships than London, which may have attracted students to these institutions. Birmingham, for example, offered twenty seven such

scholarships per annum, Leeds, over thirty eight, Liverpool, thirty one, Manchester, seventeen and Sheffield, fifty two. The University of London offered eight entrance scholarships for internal students, Bedford College, nine, Kings College, two, Royal Holloway College, twelve and U.C.L., ten. Although all of these institutions offered the prospect of a scholarship to only a small proportion of their students, the provinces offered a slightly greater hope than London.<sup>53</sup> Julie Gibert has recently confirmed that towards the turn of the century, more students were travelling to the civic universities to study.<sup>54</sup> These institutions then, not only reduced the need for provincial inhabitants to travel to study, but also began to poach prospective London students.

Of those who carried out the whole of their undergraduate training at U.C.L. however, there was a shift in the type of degrees being read. The columns for both total graduates and female graduates on the BSc degree in table 3.5 show that, with the exception of a small decline in numbers between 1890 and 1899, there was a growing trend throughout the whole period. The number of total graduates increased from eight to thirty one, and female graduates from one to nine. By 1890 the total number was in fact equal to that on the BA degree, and thereafter became more significant. This suggests that U.C.L. and its students were moving away from the 'classical' forms of education which have been judged detrimental to the needs of the British economy and industry, and was developing its strength in the sciences.

The number of women who graduated in science subjects was smaller than the number graduating in the arts, but not dramatically so, it also rose between 1880 and 1913. The college calender for 1890-91 gave an outline of requirements for the award of a BSc. Students had to study at least three of: pure mathematics, applied mathematics, physics, chemistry, botany, zoology, physiology and geography/geology.<sup>55</sup> Given that chemistry,

botany and zoology were closed to women until well into the 1880s, and physiology was not made available until 1904, as shown in table 3.3, women did well to comprise the graduate numbers that they did! As courses were gradually opened to them, so that by 1904 the only barriers to women were in engineering subjects, which broadened their choice of degree routes, more began to study. It is very significant that the female proportion of total science graduates rose to a peak of thirty per cent between 1895 and 1899 before all restrictions had been dropped, and averaged nearly twenty seven per cent over the whole period, comprising more than one quarter of science graduates. The BSc in economics had only three graduates between its inception in 1909 and 1913, two of whom were women. This is significant, but the figures are too small from which to draw any firm conclusions about a trend towards high levels of female participation in economics.

If graduates are considered as a percentage of all students at the college, it seems that their significance was surprisingly small. It is true that 'students' of U.C.L. included all those who registered with the college, but not necessarily those who completed their courses of study, or those who were studying for degrees. In addition the 'graduate' figures do not include the bachelor of laws and BSc engineering graduates who were unavoidably included in the total number of students at U.C.L. Thus we should expect graduate figures to be smaller than the number of students. We can also assume that every graduate of the college would have studied for at least three years at undergraduate level before successfully completing a degree, thus it should be taken into account that for every 'graduate' there were at least three students. This is illustrated in table 3.6 where U.C.L.'s graduates are compared to the number of students at the college, who have been divided by three.

**Table 3.6. STUDENTS AND GRADUATES OF U.C.L., 1881-1912, (AVERAGE PER ANNUM)**

Year	Total students (÷ 3)	Total graduates	Graduate % of total students
1881-1884	269	27	10.0
1885-1888	233	27	11.6
1889-1892	209	20	10.0
1893-1896	257	22	8.6
1897-1900	254	19	7.5
1901-1904	295	27	9.1
1905-1908	333	53	16.0
1909-1912	<u>458</u>	<u>75</u>	<u>16.4</u>
Average	288	34	11.8

Source: College calendars, 1881-1913, U.C.L. Records Office.

Even with the benefits of this exercise, the percentage of graduates at U.C.L. was small, ranging from 7.5 per cent to 16.4 per cent of the full student body. From 1901 to 1912 the proportion was rising, possibly indicating the start of a long term trend towards an increase in the number of degree students at U.C.L., which was undoubtedly helped by the increase in 'internal' students educated at U.C.L. as a result of the 1905 transfer act. However, it seems that even after 1900 the majority of U.C.L.'s students were studying for individual courses, possibly leading to college certificates, or alternatively contributing to a University of London external degree. This suggests that although the opening of degrees to women in 1878 swelled the numbers at U.C.L. quite significantly, most students were not drawn by the degree programmes specifically, but rather by the range of individual courses which became available as a result. This highlights the likelihood that studies of university graduates in the pre-First World War period understate the number of people who gained a higher education. In spite of this, the figures shown in table 3.5 indicate that, in total, women accounted for approximately half of all graduates, the bias being towards the arts in which they actually represented a majority between 1900 and 1909. Their participation in the sciences was far from insignificant, especially when one considers the restrictions on

women in this area of study. U.C.L. produced a considerable number of well educated women, who in theory had the capability of going into a wide range of careers and occupations.

Given that women faced considerable barriers in the faculty of science, it is interesting to establish how they went about gaining their degrees. The best way of discovering the subjects studied by women who obtained BScs was to follow through the names of female science graduates in the college fees books, and to list separately each course entry for every student. As mentioned earlier this information was easily accessible only for the period after 1885 because prior to this date the volumes were not indexed. The results are thus based on a sample six year period between 1885 and 1891, and can be seen in Appendix A. Some of the entries do not appear substantial enough to account for a complete degree. This can be explained in two ways, firstly, some of these students may have enrolled for courses in years previous to 1885, and secondly, others may not have studied for their whole degree at U.C.L. but rather enrolled for a few courses, to contribute to a degree from London University. It was not necessary to present more than the six year sample in Appendix A, because the college calendars demonstrate that there was very little change in course cost over the whole forty year span of this study, 1873-1913. Therefore, the cost of a degree was very similar in 1913 to its 1873 figure. The average cost of a one year session by 1912-13 was 34 guineas.<sup>56</sup> The earliest reference to BSc composition fees was in the year 1889-90, where the average was 38 guineas.<sup>57</sup> If anything, the cost of a degree had fallen slightly by the end of the period, but the main point is that the change was minimal.

One observation from Appendix A is that women were studying an extremely wide range of options. Every course offered in the department of science from 1879 onwards, which was also open to women, attracted female students. The exceptions were the engineering options,

and chemical technology, none of which had access for women as demonstrated in table 3.3. Even in 1888, the first year in which the course in physiology was partially opened to women, two female undergraduates enrolled for the course in advanced practical physiology. Thus there appears to have been demand for all science options, and women participated in all available courses. There is even evidence that there was female demand for the closed courses in engineering. On 27 October 1914, the faculty of engineering considered the application of Miss E Lesser for the full course in engineering, but turned it down with the following comment:

‘There is no proof as yet that women would succeed or would try to succeed in finding places as practical engineers ... It ought first to be ascertained that there is a clear opening for women in the higher branches of engineering ... Until (then), it would be premature and inadvisable for University College to act alone and throw open the engineering courses to women generally.’<sup>58</sup>

The college decision not to admit women to its engineering courses was based on a concept of female inappropriateness for the engineering profession, lack of female demand for it in spite of the application by Miss Lesser, and an unwillingness of businesses to recruit women as engineers. In other words, it relied upon its perceptions of the profession, and women’s aspirations, to advocate its own policy of non-access, indicating that the debate surrounding women and technical education had become something of a ‘catch twenty two’ situation. The concept of a low level of female demand is hard to accept when the considerable contribution of women both as science students and graduates at U.C.L. is considered. Appendix A shows that every available science option attracted women students, and implies that if technical options had been available to women, they may well have taken the opportunity to enrol. If women were not reading the most practical or technical courses at U.C.L. and therefore not graduating with the most vocational degrees, this was largely a result of the college’s policy of non-access to certain courses, rather than a lack of demand by women.



However prejudices within the labour market against women who attempted to enter traditionally male professions such as engineering, architecture, pharmacy and law were so great that women at U.C.L. probably decided against studying such subjects irrespective of their availability.

Women were not a homogeneous group in Britain, and any concept of extensive female demand for higher education should be placed in perspective. One glance at the course fees for a complete degree shows that the option of studying at U.C.L. was exclusive. Examples of women who studied for complete degrees are documented in Appendix A and are numbered 12, 13 and 14 respectively. The names of these graduates are not disclosed in order to preserve anonymity. Their course fees totalled, were £95 2s 6d, £106 11s 6d and £113 8s respectively. These figures correspond to the official composition fees for one year on the BSc degree. The college calender for 1894-5 gave a list of fees for each three subject combination which could lead to a BSc. There were ten possible combinations which ranged from fees of twenty to fifty seven guineas per session. On that basis a whole degree could cost from sixty to 171 guineas. The average cost of one year's study towards a BSc degree was thirty eight guineas.<sup>59</sup>

Eric Hobsbawm calculated that the average adult male earned approximately thirty shillings for one working week of fifty-four hours, which amounted to £77 per annum, as late as 1913-14.<sup>60</sup> In addition the Booth and Rowntree studies showed that about thirty per cent of the population was in poverty.<sup>61</sup> Hobsbawm noted that those with annual incomes of between £160 and £700 accounted for only eight per cent of the population, whilst those earning over £700 comprised a mere four per cent.<sup>62</sup> The fees for a complete degree were therefore well out of the reach of 'average' wage earners, amounting to more than the total earnings for a male wage earner in one year. Even those of lower middle class status

earning upwards of £160 per annum would have struggled to send daughters to U.C.L. as undergraduates when the cost would have been anything between £30 and £40 for one years' study, one fifth to one quarter of family income. It becomes apparent why women had to struggle more than men if they wished to study, especially given that the son in a family, which was not especially affluent, was invariably given priority over a daughter.

It is probable that as this period preceded the availability of state scholarships to university the women studying for degrees at U.C.L. were primarily of upper middle class status, and had greater opportunities to better their aspirations and prospects than less wealthy women. Local Education Authority grants were paid to individuals who gained places at University from 1911, but this is late in the period covered by this study, and in this year, although 464 grants were awarded, only ninety one went to women, just under twenty per cent of the total.<sup>63</sup> The Board of Education's scheme of awarding grants to those who committed themselves to teach after a three year degree and a one year teacher training course was introduced in 1910-11 and thus also would not have affected many of the graduates in this group.<sup>64</sup> So although a handful of female graduates of U.C.L. may have procured external funding before the outbreak of the First World War, the majority were reliant on private means. Given the cost of an education at U.C.L. this suggests that most were from wealthy backgrounds. Sheila Hamilton presents a similar picture for Glasgow University where, by 1910 only eight per cent of graduates could be described as working-class. Those who attended single classes were of more mixed social origins although the majority still tended to be from middle-class backgrounds.<sup>65</sup> Dyhouse clarifies that most university women before the First World War were of middle or upper middle-class status, and that at the civic universities, where fees were generally lower, a handful came from artisan backgrounds.<sup>66</sup> It is unlikely that women who studied single classes at U.C.L. were of a significantly different social status from graduates, and even more unlikely that working-class women

were admitted because rules regarding admission were highly exclusive. The same policy was quoted in every calendar between 1878 and 1913. The following is taken from the academic year 1913-14:

‘No woman, unless she is the wife or daughter of the provost, of a professor or an emeritus professor, is admitted as a student of the college, except upon an introduction or reference which (is deemed) satisfactory.’<sup>67</sup>

Thus, women were admitted not only on financial criteria but also on grounds of their social connections. For example, wives of professors obtained automatic admission to the ‘Debating Society for Women’, at U.C.L. whereas former members of the Ladies Educational Association did not, implying that academic experience was considered secondary to social status.<sup>68</sup> The fact that many of U.C.L.’s female students were drawn from wealthy and even upper class backgrounds suggests that they were not prompted to gain a higher education for vocational reasons and that the economic necessity of working could be ruled out. A number of accounts have argued that if such women sought a higher education, they did so to boost their social status or for dilettante reasons.<sup>69</sup> It is hard to imagine that women with such aspirations would have graduated in scientific subjects many of which had vocational applications and low status. Sheila Hamilton has responded to the contention that upper middle-class university women flirted with their education and were not particularly interested in applying their knowledge, by claiming that the first female students of Edinburgh university who graduated in the 1890s were not ‘attending classes for the decorative fun of it’, but rather were concerned with serious study which would be of use in later life.<sup>70</sup> A central feature of chapter five will be to establish how many of U.C.L.’s female graduates engaged in occupations after graduation to contribute to this debate.

It has been shown that women participated in a whole range of courses, both scientific and in the arts, and made up a significant percentage of all students and graduates between 1873

and 1913. Demand appears to have been high, at least amongst those women who could afford an education, with women participating in all options that were open to them. Where there were deficiencies, these were created by the college's policy of non-access, mostly in engineering, technological subjects, and in medicine and surgery. It was the closure of these particular courses to women which meant they were unlikely to qualify with highly technical and practical degrees or certificates. This, more than any other factor affected opportunities for women's later economic activity. However, this should not overshadow the fact that female participation levels at U.C.L. were extremely high, and that in spite of those options which were closed to women, U.C.L. was a pioneer in embarking upon mixed higher education for men and women. Irrespective of the ways in which these women later used their qualifications, this study of U.C.L. has shown that, with regard to an education in its own right, women participated to a degree far greater than that emphasised by many histories of women's education, and particularly that they did so in science subjects. The discussion now turns to the polytechnic at Regent Street, and assesses the participation of women at this institution in the period 1888-1913.

### NOTES TO CHAPTER THREE

1. College calendar, 1913-14, p. 34, U.C.L. Records Office.
2. N Harte and J North (1978), p. 46.
3. Ibid, p. 58 and p. 73.
4. N Harte (1979), pp. 3-6.
5. M del Carmen Serrano-Widowson (1991), p. 35.
6. N Harte, op.cit, pp. 7-8.
7. H H Bellot (1929), p. 371.
8. Ibid, p. 372; N Harte, op.cit, p. 3.
9. H H Bellot, op.cit, p. 372; N Harte, op.cit, p. 17.
10. Faculty of engineering minute book, 27 October, 1914, U.C.L. Records Office.
11. N Harte, op.cit, p. 17.
12. C S Bremner (1897), p. 140; A Zimmern (1898), p. 439
13. College correspondence, J Mylne, 1870-78, U.C.L. Manuscripts Room.
14. C Dyhouse (1995), pp. 12-13.
15. Ibid, p. 5; M Tylecote (1941), pp. 58-73..
16. N Harte, op cit, p. 16. These figures are taken from 'statement of present requirements and proposals for completion of the building' (1878), p. 7, U.C.L. Manuscripts Room.
17. J Senders Pedersen (1979), pp. 71-4.
18. S Kelly (1984), p. 2, pp. 16-7, pp. 22-3 and p. 49.
19. See for example, the Englishwoman's Yearbook, 1881-1916, the Journal of the Women's Education Union, 1873-1881 and the Englishwoman's Review, 1870-1910.
20. C S Bremner (1897), p. 140; C Dyhouse (1995), pp. 122-3.
21. U.G.C., Report for the period 1929-30 to 1934-35 (1936), p. 26.
22. Englishwoman's Review (1886), p. 504.
23. C S Bremner op cit, p. 154.
24. Englishwoman's Review, (1905), p. 32.
25. M Tylecote (1941), pp. 27-8, p. 47 and pp. 52-3.

26. C S Bremner, op.cit, pp. 154-5.
27. J Gibert (1994), pp. 408-9.
28. U.G.C., op.cit, see full report and p. 26 in particular.
29. SPR. MIC. E.291, parliamentary papers, 1900, XX, p. 259, British Library.
30. Ibid.
31. N Harte (1986), p. 127 and p. 164.
32. U.G.C, op.cit, pp. 52-3.
33. College correspondence AM/C/7B, 1878, pp. 2-4, U.C.L. Manuscripts Room.
34. P Thane (1992), p. 303.
35. D Sugarman (1993), p. 297.
36. J Howarth and M Curthoys (1987a), p. 8.
37. N Harte, op.cit, p. 17.
38. College correspondence AM/C/7B, 1878, p. 4, U.C.L. Manuscripts Room.
39. UCL MEM/1B/18, U.C.L. Manuscripts Room; C Dyhouse (1995), pp. 33-4 also outlines Adamson's experiences.
40. C S Bremner, op.cit, p. 142.
41. UCL MEM/1B/18, U.C.L. Manuscripts Room.
42. College correspondence AM/C/7B, 1878, p.4, U.C.L. Manuscripts Room.
43. Englishwoman's Review (1909) p. 51.
44. L Moore (1991), pp. 43-8; S Hamilton (1983), pp. 112-13.
45. Englishwoman's Review, (1909), p.259.
46. M Tylecote (1941), p. 27 and p. 44.
47. For an example of this view see M Sanderson (1972), pp. 314-15 and pp. 337-8.
48. Englishwoman's Review (1909), p. 51 and p. 259.
49. H H Bellot, op.cit, pp. 401-2, N Harte and J North, op.cit., p. 132.
50. N Harte and J North, op.cit, p. 132; N Harte (1986), p. 179.
51. D R Jones (1988), p. 17.
52. Ibid, pp. 6-7 and p. 100.

53. Central Bureau for the Employment of Women (undated, BL catalogue suggests 1910, 3rd edition), pp. 6-16.
54. J Gibert, op.cit, p. 410.
55. College calendar, 1890-91, p. 44, U.C.L. Records Office.
56. College calendar, 1912-13, p. 23, U.C.L. Records Office.
57. College calendar, 1889-90, p. 45, U.C.L. Records Office.
58. Statement by J A Fleming, College Dean, faculty of engineering minute book, 27 October, 1914, U.C.L. Records Office.
59. College Calendar 1894-5, p. 43, U.C.L. Records Office.
60. E J Hobsbawm (1968), p. 167.
61. D Oddy (1970), p. 320.
62. E J Hobsbawm (1968), p. 167; B R Mitchell, op.cit, p. 24.
63. G S M Ellis (1925), p. 10; C Dyhouse (1995), p. 30.
64. SPR.MIC.E.291, parliamentary papers, 1911, L1X, pp. 2-7 of section beginning page 17, British Library; C Dyhouse, op.cit, p. 20.
65. S Hamilton (1982), pp. 59-60.
66. C Dyhouse, op.cit, p. 26.
67. College calendar, 1913-14, p. 2, U.C.L. Records Office.
68. Committee of management minute book, 1873-80, pp. 429-30, 27 November, 1878, U.C.L. Records Office.
69. J Burstyn (1980), pp. 139-40 outlines this view.
70. S Hamilton, op.cit, p. 58.

## **CHAPTER FOUR:        SCIENTIFIC AND TECHNICAL TRAINING FOR WOMEN, AT THE POLYTECHNIC AT REGENT STREET, 1888-1913**

### **SOURCES AND METHOD OF RESEARCH**

Most of the information which was used in this study was located in the archives of the University of Westminster, which was formerly the Polytechnic of Central London. The most useful data was found in a number of unpublished documents. A series of 'candidate books', which provided details of male college members between 1880 and 1915, and women between 1904 and 1915 was of particular value. These candidate books were compiled separately for males and females, and each student was registered with an individual number, which made a quick calculation of the number of men and women who held membership possible. In addition, the volumes provided details of the student's daytime occupation where relevant, age and address, and noted whether the student was an apprentice. This data was extremely useful as a guide to establishing the social composition of the student body, and assessing motivations for study.

A certain amount of ambiguity surrounded the candidate books however. Although the volumes themselves carried this title, the university archives catalogued them as 'membership books'. Thus, there was some uncertainty as to whether they contained information on current college members, or prospective candidates for membership. The male candidate books during the 1880s included both a list of prospective candidates, and college members, so the volumes at this time acted as current registers and waiting lists. However, during the years 1904 to 1913, a separate list of prospective candidates no longer appeared. Thus it seems that the volumes for this period were of current members only. This is convincing when it is considered that between 1906 and 1910 membership figures fell very dramatically as table 4.1 demonstrates, and it is unlikely that this would have happened had a long waiting



list existed. Other unpublished records were volumes of examination results from various college departments, which formed the basis for the bulk of this investigation. The method of extracting information from these volumes, was much the same as that employed with the calendars at U.C.L. The number of male and female names was counted separately for each course, of which there were sixty nine in total, and where initials appeared, the assumption was made that these were male candidates. The departments for which examination results were available were the department of science and art, for the period 1897-1911, and the practical trade classes, which led to City and Guilds qualifications, for the period 1895-1904. Although there were other college departments, for example the department of commerce, no records of examination results in these areas seem to have survived.

The university also housed a selection of published records, which offered some useful information on college policy, course content, fees and membership. Of particular value was a series of college prospectuses, which commenced in 1888-89, and then after a gap of thirteen years, continued from 1901 through to 1914. Secondly, there was a full series of college magazines, entitled Home Tidings from 1876 to 1886, and then renamed The Polytechnic Magazine. According to Ethel Wood, the decision to change the name was taken, because during the 1880s a number of new polytechnics were developing around London. It was felt that Regent Street should adopt the name Polytechnic Magazine before another institution did, to mark its place as a pioneer establishment.<sup>1</sup> These magazines provided some insight into student attitudes, current policy issues and social activities, and aided the analysis of figures extracted from the examination results. Before discussing the results of this research a short outline of the polytechnic's history is provided, to aid an understanding of the nature of female education and the way in which it developed.

## THE DEVELOPMENT OF QUINTIN HOGG'S POLYTECHNIC AND THE BIRTH OF THE Y.W.C.I

In April 1838, at 309 Regent Street and the house that backed onto the building, 5 Cavendish Square, the 'Polytechnic Institution' was formed. At this time it was primarily a gallery used for the display of science exhibitions, although after receiving a royal charter in 1839, it began an educational programme almost immediately.<sup>2</sup>

'The Royal Polytechnic Institution had an educational programme almost from the start : classes in new techniques such as engine driving and marine engineering were running by 1844 and there were general lectures in chemistry, with practical laboratory sessions.'<sup>3</sup>

By 1870, the institution was known as the 'Polytechnic College' and as such incorporated the old department of art, science and literature and a new range of 'industrial classes', of which the development of a building class was 'the tentative commencement of technical instruction'.<sup>4</sup> However, the polytechnic was primarily a place of recreation and less an educational establishment, with its famed gymnasium and swimming baths making it 'practically speaking, a club for the wage earning class'.<sup>5</sup> The emphasis changed somewhat in 1881, when the grounds at Regent Street were leased to Quintin Hogg after the previous owners fell into financial difficulty. Under new directorship, the building soon spread beyond Regent Street to Cavendish place, and a number of 'practical trade classes' were embarked upon. The introduction to the polytechnic prospectus for 1888 which was reprinted from The Times of April 23rd 1888, outlined the college's commitment to technical and practical education as a response to the climate of competition and new technology in the late nineteenth century.

'At a time when the demand for technical education is heard on all sides, when it is being taken up by parliament, and when the charity commissioners are announcing their intention of devoting large sums of money to the furtherance of it, the public will be glad to learn something about one of the most

remarkable social experiments that has ever been made with technical education for its principal, though not exclusive object. This is the Polytechnic Institute in Regent Street'.<sup>6</sup>

By 1894, 500 separate evening classes were running each week. There had indeed been an enormous growth of educational work at the polytechnic,<sup>7</sup> although social activities still dominated. When Hogg took ownership of the polytechnic in 1881 it was renamed the Polytechnic Young Men's Christian Institute (Y.M.C.I.), essentially because Hogg, a devout christian, was attempting to instill a spiritual element into education which he felt was lacking in secular institutions such as Birkbeck College.<sup>8</sup> In 1888, a separate college for women was opened at 15 Langham Place, and named the Polytechnic Young Women's Christian Institute (Y.W.C.I.). From this point onwards the whole institution was simply known as the polytechnic at Regent Street or more colloquially as 'The Polytechnic'. Although the founding of the Y.W.C.I. appears to have offered an opening for women's education and training to develop, the idea of educating women at the polytechnic was not particularly new. Back in the 1870s, women had been free to attend all classes of evening instruction at Regent Street. This is confirmed by the Royal Polytechnic Programme for 1873 which boasted of: 'classes of evening instruction : for both ladies and gentlemen',<sup>9</sup> the majority of which were scientific, commercial or arts courses. Unfortunately, the archives do not have any information on student participation on courses before Hogg took ownership in 1881. Therefore, it is not possible to ascertain the extent to which women were involved in these open classes.

As the polytechnic began to emphasise the importance of practical and technical training after 1881, women were increasingly offered a curriculum which appeared heavily 'gendered'. Men were encouraged to take classes in bricklaying, carriage building and carpentry for example, whilst women were offered a carefully distinctive educational route, designed to make them better wives and mothers or to fit them for traditional female trades. The

following excerpts from the Polytechnic Magazine of 1888 are taken from sections written by Quintin Hogg, speaking of the introduction of separate Y.W.C.I. classes:

'Our first move in this direction shall be made this month, when we shall start special classes for young women in dressmaking, millinery and mantle making.'<sup>10</sup>

'On Monday week, we commence a special course of instruction in plain and high class cookery ... I should like our members to recommend these classes to their sisters' and cousins' attention ... Among the qualifications of a good wife, a knowledge of cookery certainly is not the least desirable.'<sup>11</sup>

From 1888 onwards, women had their own college, and therefore recognition within the institute. However unlike the previous decade, they now had specifically 'female' classes designed for them, and although there were no formal restrictions on their studying most other courses offered at Regent Street, they were strongly encouraged to follow a particular route, deemed 'appropriate'. This is not to say that they followed this advice, as the following sections will demonstrate. Importantly, this introduction has shown that the development of women's education at the polytechnic did not develop in a linear manner and thus may offer insights into women's subject choices before the First World War. The following sections consider female participation rates in various subjects, but firstly a general impression of the scale of student attendance must be gained. For this purpose, the discussion turns to a consideration of the membership of the polytechnic.

## **POLYTECHNIC MEMBERSHIP**

The details of polytechnic members were recorded in the candidate books for the Y.M.C.I. and the Y.W.C.I. respectively from 1904 to 1913. Aside from the uncertainty outlined earlier about the difference between candidates and members, the term 'member' contains a further ambiguity: to gain polytechnic membership, one did not also have to be a student.

The polytechnic offered a range of social and recreational facilities, and a number of people 'joined' the institute to gain access to these, rather than to enrol for educational courses.<sup>12</sup> Thus the figures presented in table 4.1 may not be a true reflection of the number of students at the polytechnic. However the ratio of women to men should not be misleading, unless one group used recreational facilities proportionately more than the other. A glance at various issues of the Polytechnic Magazine showed that most of the societies at the polytechnic were sports based, with cricket, football and rugby predominating.<sup>13</sup> If anything, this implies that men were more likely to join a recreational club than women. In addition, the polytechnic prospectus for 1901-2 provided a list of social activities in which women could participate. The options were considerably narrower than for men and the swimming pool was restricted to one day only for women's use.<sup>14</sup> Again this highlights that in all probability male 'recreational' membership was higher than female and that table 4.1 over estimates the number and proportion of men engaged in educational activities. The female rate should certainly be considered as a minimum.

**Table 4.1 POLYTECHNIC MEMBERSHIP, 1905-1913.\***

Year	Total membership	Female membership	Female members as % of total
1905	1,829	434	23.7
1906	1,881	500	26.6
1907	1,796	470	26.2
1908	1,608	417	25.9
1909	1,545	419	27.1
1910	1,000	307	30.7
1911	1,475	321	21.8
1912	2,072	551	26.6
1913	<u>2,140</u>	<u>586</u>	<u>27.4</u>
Average	1,705	445	26.1

\* The small nine year span 1905-1913 was used because records of female membership did not exist before 1904 (which was an incomplete year).

**Source:** Candidate books 1905-1913, p106a and p107a, University of Westminster archives.

Women comprised, on average, just over one quarter of the total polytechnic membership between 1905 and 1913, ranging from 21.8 to 30.7 per cent. Although their participation was not so great as that observed at U.C.L., these figures are far from insignificant, especially given that the female students in table 4.1 are probably obscured by a higher number of male social members. Between 1905 and 1910 the number of men and women declined consistently reaching a trough in 1910, so much so that the number of males, 693 by this date, was less than half its 1905 figure of 1,395. The number of women also slumped to 307 by 1910, although this shift was not so dramatic as the change in the male figure. This explains why the female percentage of total membership rose to 30.7 per cent by 1910. Between 1911 and 1913, in contrast, male and female participation rose dramatically, so that by 1913, the numbers of male and female members were at their highest, 1,554 and 586 respectively.

Unlike U.C.L., the polytechnic drew virtually all its members from the vicinity of London, because most studied after work on an evening basis. For this reason, events within London in the first decade of the twentieth century are probably of greatest relevance in explaining both the fall and rise in participation at Regent Street between 1905 and 1913. From the 1890s onwards, a number of new polytechnics opened in London, after the Technical Instruction Act of 1889 and the Local Taxation Act of 1890 allowed rate money to be spent on technical training.<sup>15</sup> In addition, in 1891, the Royal Charities Commission agreed to give annual grants to thirteen London based polytechnics, which greatly improved their financial position, and as Wood states, marked the beginning of the 'Polytechnic Movement'.<sup>16</sup> In 1882, Regent Street was the first of the London polytechnics, and therefore enjoyed unrivalled dominance in this sector, however by the 1890s and the early part of the twentieth century, it had to face growing competition, and some loss of students

to other institutions. By 1897 there were nine polytechnics in London,<sup>17</sup> and by 1904 twelve in total.<sup>18</sup>

Although rivalry began in the 1890s, it seems to have become more intense by about 1904 when polytechnics such as Woolwich, which had opened in 1890, and the South Western at Chelsea, in 1896, expanded the range of evening classes which they offered, Woolwich developing separate subject departments for the first time.<sup>19</sup> By 1906-7 the South Western was registering students for London matriculation examinations, and selected University of London degrees,<sup>20</sup> therefore competing in some of the more prestigious subjects with Regent Street. When these institutions opened, they were primarily recreational and social clubs,<sup>21</sup> very much like Regent Street had been in its earlier days, and therefore offered less direct competition. Once they took on a more 'educational' role, it became increasingly difficult for Regent Street to maintain its student population. In addition, the death of Quintin Hogg in 1903 probably created some short-term turmoil for the polytechnic, because he had taken such a direct and paternal role in the organisation of the college.

However, the education committee of the London County Council (L.C.C.) continued to award a much higher grant to Regent Street than to other polytechnics, £2,465 as compared to between £187 and £520 in 1904.<sup>22</sup> In addition, although Regent Street was losing some potential membership to other polytechnics, in 1907 its student roll was far in excess of other establishments, with the number on record in this year being 10,753, compared to the second largest institution, the South Western which had 5,290 students. The other polytechnics all had lower rates of participation than this.<sup>23</sup> More importantly, these L.C.C. figures are much higher than those documented in table 4.1 for 1907, only 1,796. This suggests that the candidate books are unreliable as a guide to student participation, and that most students did not choose to join the polytechnic as members. However the candidate books were the

only source which gave general figures of male and female involvement on an annual basis, and this made them hard to disregard. It should be borne in mind though that the figures in table 4.1 are incomplete, and not an accurate indication of male and female participation as students.

Changes in course fees within the polytechnic may help to explain the fall in membership between 1905 and 1910. Table 4.6 below provides details of a small sample of courses at the polytechnic, and their cost per quarter. Three of the six courses raised their fees between 1906 and 1907 after prices had been stable for thirteen years, and by 1913, four had raised their cost. The fees for 'shorthand and typing' were raised by forty per cent, and brickwork and masonry by fifty per cent initially, followed by further rises up to 1914. If these kind of increases were common across the polytechnic, they provide a reasonable explanation for a significant fall in student numbers to 1910. However, they do not explain the sharp rise in figures up to 1913, and there is certainly no indication that course fees fell after 1910. It is also difficult to explain why membership rose again after 1910, given that the new polytechnics, which had been established during the 1890s, were still in existence and if anything were expanding their membership at this time.<sup>24</sup> It can only be assumed that the growth of polytechnic work in the capital increased interest in and awareness of technical education and training generally, especially after the education acts of 1870 and 1891 boosted general levels of literacy. It is also possible that once the novelty of the new institutions had worn off, Regent Street was able to win back a number of students, because of its long record of excellence.

It should be mentioned that the L.C.C. Education Committee provided figures of all male and female students taking both day and evening classes at Regent Street between 1908 and 1909. The total student figures in this year were 9,130 of whom 4,050 were reported to be



female. Thus women comprised 44.3 per cent of the student body, an exceptionally high figure, which is certainly not indicated by the candidate books.<sup>25</sup> It appears that these volumes are highly inaccurate, and seriously underestimate women's participation as students. It can only be assumed that they recorded mainly social members. Unfortunately the L.C.C. only provided such figures for Regent Street in this one year. However the findings indicate that women were indeed a significant group within the polytechnic, a feature which has rarely been recognised in accounts of technical and practical training. The following sections will demonstrate the areas of study in which these, surprisingly large numbers of women, took part, and attempt to discover whether they were involved in a wide range of subject areas or whether they were more commonly to be found in certain educational niches.

Unlike U.C.L.'s data from 1900 onwards, the polytechnic archives had no records of female participation as students in different subject areas. However, the archives did house a number of volumes which listed examination results for subjects in the departments of science and art, and also City and Guilds qualifications. Examination results are unlikely to be an accurate guide to the number of students who participated in different subjects, because they only present a record of those who actually sat a paper. Thus, they offer similar information to the 'graduate' figures from U.C.L. However, the results are useful because they show trends of female participation in various subject areas, even if they do not offer a numerical total.

## **CITY AND GUILDS EXAMINATION RESULTS**

The examination results from the department of science, and similarly the department of art probably come closest to representing the actual number of students who participated in classes, because they provided figures of both passes and failures. The City and Guilds

results, in contrast, only listed those who passed, and therefore the number of students who took part in these subjects may well have been higher than the examination results suggest. In the final volume of City and Guilds examination results, for 1904, failure rates were also provided.<sup>26</sup> In this year the number of students who failed was slightly higher than the number who passed, which helps to explain the small numbers shown in table 4.2 compared to those in the department of science shown in table 4.3. The City and Guilds results cover a ten year period from 1895 to 1904, because there was no documentation for years outside this period. I have placed the various subjects under grouped category headings for ease of analysis.

**Table 4.2 CITY AND GUILDS EXAMINATION PASSES, 1895-1904, AGGREGATES**

Course	Total passes	Female passes	Female passes as % of total
<b>Clothing Manufacture</b>	<b>130</b>	<b>54</b>	<b>41.5</b>
Boot and shoe	76	0	-
Dressmaking	41	41	100.0
Millinery	13	13	100.0
<b>Food and drink</b>	<b>30</b>	<b>28</b>	<b>93.4</b>
Advanced cookery	13	13	100.0
Plain cookery	15	15	100.0
Brewing	2	0	-
<b>Skilled crafts and trades*</b>	<b>2,129</b>	<b>0</b>	<b>-</b>
<b>Printing and Communications</b>	<b>994</b>	<b>65</b>	<b>6.5</b>
Lithography	15	0	-
Typography	452	0	-
Printing	30	0	-
Telegraphy and telephony	91	41	45.0
Photography	406	24	5.9
<b>Total</b>	<b>3,283</b>	<b>147</b>	<b>4.5</b>

\* There were sixteen separate courses in this category which included examples such as gas manufacture, metal plate work, electrical engineering, brickwork and masonry, carpentry and joinery, plumbing and mine surveying.

**Source:** City and Guilds examination results, p119a to p119f, University of Westminster archives.

The number of women who passed City and Guilds examinations was very small, and they comprised only 4.5 per cent of the total. As there was no available information for rates of failure it is impossible to know whether women failed in very high numbers, or whether they simply did not take such courses. However, the fact that the largest category, skilled crafts and trades, recorded no female passes over a period of ten years, implies that some kind of restriction was operating against female access to such courses. Also, results from the department of science show that women were no more likely to fail courses than men, if anything they had a slightly higher propensity to pass, as table 4.4 demonstrates.

There were certain areas of study in which women played a more significant role, of which clothing manufacture is one example. Within this category there were forty one female passes in dressmaking and thirteen in millinery between 1895 and 1904, and significantly no men passed such courses. In contrast, there were seventy six male successes in boot and shoe manufacture, but no female passes. Thus it appears initially that women and men followed 'gendered' routes when choosing courses. This seems also to have been the case in the category 'food and drink' where thirteen women passed in advanced cookery, and fifteen in plain cookery. In contrast the two passes in brewing were both male. This subject was only introduced in 1903, which explains its small aggregate figure. According to the prospectuses for 1901 to 1908, cookery classes served two possible functions. These were, to train women for work in the catering industries and for domestic service, or to equip them to be better wives and mothers within their own domestic environments.<sup>27</sup> This demonstrates that the move towards domestic training for working-class girls was applied not only in schools<sup>28</sup> but also in adult education. However, the number of women who chose such subjects was small compared to their participation in other areas of the curriculum such as arts and sciences, as a later discussion will show. Although 'special classes for young ladies' were

introduced after 1888, prescribing study in cookery and handicrafts, it is far from clear that women embraced these options in large numbers.

In other City and Guilds examinations however, women's presence was tiny. No women participated in skilled crafts and trades such as road carriage building, watch and clock making, cabinet making or plastering, or any of the other eleven courses, some of which are listed in table 4.2. These classes were far more significant statistically than those in cookery, millinery and dressmaking. It would be easy, here, to accept the frequently proposed view, that women chose not to participate in such trades, because the work was heavy and dirty and the training, normally by system of apprenticeship, was long. This was emphasised by Cadbury in 1909:

‘There is a very general complaint that girls will not learn a trade because, in the first place, they all hope to marry and thenceforth be under no necessity of earning their own living.’<sup>29</sup>

However, he then proceeded to state: ‘One would think that the existence of such a vast number of married women working in factories in a city like Birmingham would have a sobering effect on such speculations.’<sup>30</sup> This contemporary account recognised a low level of female skill and training in relation to male participation, but diagnosed the root causes as a lack of social acceptance of female training, unwillingness of parents to subsidise daughters through a period of apprenticeship and a general ignorance of most women of the benefits of learning a trade.<sup>31</sup> This is not consistent with a natural aversion to such training, and it is particularly unlikely that women who were enrolled with the Y.W.C.I., and therefore more aware than other females of the benefits of education and training, would fit this mould.

Nor does it appear that the polytechnic overtly prevented women from studying any course. In fact, the prospectus for 1888-89 confirmed that all evening classes were open to both men and women.<sup>32</sup> This, appears at first glance, to reinforce the view that women avoided practical trade classes, preferring to take part in more traditional subjects such as cookery and dressmaking. However, it is not sufficient to accept the polytechnic's pledge of equal access at face value. The following extract from the prospectus for 1888-89 shows that the policy was considerably different in theory from practice:

'(Practical trade) classes are established with a view of giving apprentices and young workmen a thoroughly practical and systematic course of training in their various handicrafts..... Only those are eligible to attend classes in this section who are actually engaged in the trade to which these subjects refer, unless an extra fee be paid.'<sup>33</sup>

The biggest obstacle to women who wished to obtain places on practical trade courses, was that they had to hold an apprenticeship or participate within a relevant trade before they could enrol. The following discussion will demonstrate that it was virtually impossible for women to gain apprenticeships or even entry into many trades in the late nineteenth century. So, although there were no official restrictions at the polytechnic, the obstacles within the labour market were such that women were often unable to enrol for such subjects. The incentive for women to pay an extra fee for the privilege was slight, given that most would have faced great difficulty in practising their trades after qualifying.

A Ministry of Labour report for 1920, slightly later than the period covered by this study, on the education of apprentices in the building trade, showed that training in the trades of masonry, bricklaying, carpentry and joinery, plastering and painting was available only to boys,<sup>34</sup> even after the gains made by women in the field of employment during the First World War. All of the above were offered as practical trade courses at the polytechnic, and all were courses with no female examination passes. The closure of building apprenticeships

to women explains convincingly the reasons for their non-participation, whilst offering a critique of the notion that women 'chose' not to opt for certain areas of training. The fact that the college did not operate a gender-bar is inconsequential, when wider social restrictions such as government, union and employer policy prevented access. The result was that many practical trade courses were male dominated. Engineering was another area in which women failed to participate at the polytechnic, and yet they were not excluded from working in the engineering trades. In fact, between 1861 and 1911, vast increases in such employment took place. A report commissioned by the Fabian research department and Fabian women's group in 1918 discovered that:

'The total number of women employed in the engineering and allied metal trades, which rose only from 44,000 to 58,000 between 1861 and 1891, rose from 58,000 to 85,000 between 1891 and 1901, and from 85,000 to 128,000 between 1901 and 1911'.<sup>35</sup>

Although women's participation in engineering undoubtedly increased during this period, the types of work which they carried out were confined to machine minding, light drilling, press and lathe work. It was precisely because mechanisation increased, that women's employment rose. Their work was deemed unskilled, required no apprenticeship and was poorly paid. Drake stated that of four categories of worker, fully qualified, skilled, semi-skilled and unskilled, women before the First World War participated in the latter two categories only. She claimed that no women gained apprenticeships or equal wages with men before the war, and that parents and employers were unwilling to spend valuable resources on their training, when the expectation was that they would leave work after a few years to marry.<sup>36</sup> For these reasons, women probably found that securing training at an educational establishment such as Regent Street, was impractical. It was not until 1918, and the foundation of the Women's Engineering Society that they were able to begin training fully as engineers. The

position in which women found themselves in the pre-war period regarding the availability of employment positions is summed up in the following extract:

'Roughly speaking, what are regarded as normal (pre-war) women's trades comprise various processes in the textile trades (including lace and hosiery), the dress and clothing trades, domestic occupations, laundry work, certain processes in printing and stationary and in boot and shoe making, and in certain parts of the country (chiefly the West Midlands), various small metal trades. In addition women had gained entry in considerable numbers into the lower grades of clerical work'.<sup>37</sup>

According to this report, a number of the practical trade courses offered at the polytechnic were of relevance to women and prepared them for trades in which they could participate, for example metal plate work, boot and shoe making and printing. However, no women successfully sat examinations in these subjects at the polytechnic. Cadbury's 1909 study of Birmingham found that the trades in which women could make the greatest impact and earn the highest wages, at least in the manufacturing sector, were dressmaking and upholstery, because it was in such areas that they were most likely to be apprenticed.<sup>38</sup> Clementina Black, in a similar study of 1915 commissioned by the Women's Industrial Council, found that in London the vast majority of work carried out by married women was in the area of textile manufacture, or various other forms of manufacture such as artificial flower, bag and box and preserve making.<sup>39</sup> This was perhaps to be expected in a survey of married women workers, who frequently worked from home because of the restrictions many firms held against them. The fact that the single largest category of employment for married women in London was laundry work, a non-manufacturing occupation, but one which could be carried out from home is evidence of this.<sup>40</sup> Although younger, single women could more easily gain access to trades such as metal working, printing and boot and shoe making they were usually employed in subservient positions, were less likely to gain an apprenticeship

than they were in textile work and long-term employment could not be guaranteed after marriage.

This is evidenced by a consideration of the branches of the metal trades in which women worked. The majority were engaged in press work, or unskilled machine operation, lathe work, which was more skilled, but rarely learned through systematic training, soldering, where the skilled work was invariably carried out by men, and surfacing, which with the exception of lacquering was unskilled. The few women who did take part in more skilled areas of the metal trades confessed to learning by 'picking up' the trade, rather than by receipt of a thorough training.<sup>41</sup> Thus it is not surprising that they did not take part in college training courses. Similarly, women working in the boot and shoe trade undertook different tasks from their male colleagues. Women in general machined the uppers of shoes whilst men designed, cut and nailed them.<sup>42</sup> Although the role of women as machinists should not be undervalued, and was certainly skilled, although rarely recognised as such, the boot and shoe manufacturing course at the polytechnic would not have aided the career development of most women, because it was essentially design orientated.

In the printing industry, machinery was gradually being introduced throughout the nineteenth century to replace the skilled positions of compositor and stereotyper, which traditionally had been held by men. The result was that women were able to participate in printing in much larger numbers than previously. Hunt shows that the number of women in the printing trade rose from 2,000 in 1840 to 30,000 by 1901. However, there were still only around four female printers to every 100 males, therefore the scale of female involvement should not be overstated.<sup>43</sup> In addition, women were excluded from specialist unions such as the London Society of Compositors, which meant that their wages remained inferior to male earnings, and women were firmly placed within the semi and unskilled sectors of the trade.<sup>44</sup>



Cadbury believed that boys increasingly refused to do such work because it led to 'nothing in the future'.<sup>45</sup> If this type of work really did have no future prospects, then it is certainly unlikely that women would have seen the attraction of courses such as typography, lithography or printing at the polytechnic. This in part justifies the polytechnic's decision to create separate, relevant classes for young women, so that they would at least be able to use their qualifications to some benefit. It also shows that women's choices in education were determined by their vocational usefulness.

Although women did not train specifically as printers, table 4.2 shows that sixty five women participated in the broad category of printing and communications at the polytechnic. These women all took courses in photography, telegraphy and telephony. In photography they comprised just under six per cent of the total, but most significantly they accounted for forty five per cent of those in telegraphy and telephony. This high level of participation was matched by the availability of careers for women in this area, as Clinton demonstrates:

'In 1882 there were 321 women in clerical posts, and 1,978 working as counter hands or telegraphists. By 1911, when most of the telephone system had been taken over (by the Post Office), 26,591 out of a total of 106,170 who worked for the department were women.'<sup>46</sup>

In spite of this high proportion of female workers, the Post Office placed plenty of restrictions on women. An official marriage bar was in operation which was not lifted until 1946.<sup>47</sup> Also, women had to accept a widely different pay scale from their male colleagues, earning one third of the male rate for the high post of principal clerk, and two thirds of this rate for posts of counter-clerk and telegraphist.<sup>48</sup> According to the Englishwoman's Yearbook, 1890, the wages of telegraphists and telephonists commenced at the low figure of ten shillings per week.<sup>49</sup> Both of these features hindered women in terms of career prospects and promotion, and therefore it is quite remarkable that such a high proportion of

women passed courses in telegraphy at the polytechnic. This was probably a response to the problem that, as Daunton points out, the Post Office offered few chances of promotion or training for women, and thus if they wished to gain superior posts, they found it necessary to gain external training.<sup>50</sup>

The proportion of women who took examinations in photography was 5.9 per cent. This may appear a rather small figure, but it marked the beginning of an era in which photography became a recognised occupation for women. Michael Pritchard has noted that towards the turn of the twentieth century the number of women working in photography increased at a proportionately faster rate than the number of men, so that in 1861, they had accounted for only eight per cent of all photographers whilst by 1891, their proportion was closer to twenty four per cent.<sup>51</sup> Around the turn of the century, two contemporary reviews suggested that although there were good opportunities for women as photographers, many were not succeeding in the open market due to a lack of training. Both specified the polytechnic at Regent Street as offering the best training available.<sup>52</sup> Significantly, chapter nine below shows that by the 1920s, the proportions of men and women studying photography at the polytechnic were virtually equal. This implies that the advice given to women was taken seriously, and that the gradual inclusion of women as students of photography between 1895 and 1904 marked the beginning of a rising trend.

The most significant discovery from the examination results of City and Guilds subjects is that women participated to the greatest extent in courses which offered them the possibility of furthering a career of some kind. This emphasises that although women were keen to be trained and educated, their involvement in practical trade subjects was small because so many external restrictions were in operation. Although a number of women followed the designated female trade classes other women at the polytechnic did not. The department of

science, which did not have any trade membership requirements, also appealed to a number of women, as the following section will demonstrate.

## DEPARTMENT OF SCIENCE EXAMINATION RESULTS

The results of examinations in the department of science were recorded for a longer period than the City and Guilds examination results. The figures shown in table 4.3 cover a fifteen year period from 1897 to 1911, with the omission of figures for 1908, for which no data was available. Again the results have been presented under category headings which have been created for ease of analysis. Table 4.3 records all examination results, both passes and failures, and therefore comes closer to offering a total of the number of students participating in each course than the City and Guilds results.

The total number of female students, and their percentage of all students in the department of science was considerably higher than it was in practical trade examinations, although still quite small at twelve per cent of the total. Given that twenty six per cent of polytechnic members were female according to the candidate books, and that the L.C.C. records showed that these figures significantly understated women's participation, by around eighteen per cent, it appears that women were finding their main educational niche elsewhere. For the moment, patterns of female involvement within the department of science should be considered. Technically the science department and City and Guilds examination results cannot be compared, unless both sets of results are presented for an equal time period, and for pass rates alone. Table 4.4 provides this recalculation. City and Guilds results are presented as in table 4.2, and science results are given by pass rate only, and for a ten year average.

**Table 4.3 DEPARTMENT OF SCIENCE EXAMINATION RESULTS, 1897-1911, AGGREGATES**

Course	Total	No. of females	Female % of total
<b>Design and construction</b>	<b>5,232</b>	<b>40</b>	<b>0.8</b>
Practical plane geometry	1,174	38	3.2
Machine construction and drawing	1,429	0	-
Building construction	2,629	2	0.1
<b>Mathematics and mechanics</b>	<b>4,329</b>	<b>281</b>	<b>6.5</b>
Mathematics	1,206	145	12.0
Theoretical mechanics	405	18	4.4
Applied mechanics	692	1	0.1
Sound, light and heat	351	34	9.7
Magnetism and electricity	1,027	83	8.1
Steam and heat engines	648	0	-
<b>Chemistry</b>	<b>1,707</b>	<b>115</b>	<b>6.7</b>
Theoretical inorganic	716	59	8.2
Practical inorganic	699	52	7.4
Theoretical organic	149	2	1.3
Practical organic	143	2	1.4
<b>Natural and animal science</b>	<b>343</b>	<b>122</b>	<b>35.6</b>
Geology	88	15	17.0
Mineralogy	37	1	2.7
Physiography	71	36	50.7
Zoology	29	8	27.6
Botany	118	62	52.5
<b>Human biology</b>	<b>1,404</b>	<b>1,003</b>	<b>71.4</b>
Human physiology	746	539	72.2
General biology	45	14	31.1
Hygiene	613	450	73.4
<b>Agriculture</b>	<b>178</b>	<b>23</b>	<b>12.9</b>
<b>Total</b>	<b>13,193</b>	<b>1,584</b>	<b>12.0</b>

**Source:** Department of science examination results, p116a-h and p117a-g, University of Westminster archives.

**Table 4.4 TOTAL PASSES IN CITY AND GUILDS AND DEPARTMENT OF SCIENCE EXAMINATIONS, TEN YEAR AVERAGE**

	Total passes	Female passes	Female passes as % of total
City and Guilds	3,283	147	4.5
Science Department	5,796	800	13.8

**Source:** City & Guilds examination results, p119a to p119f, and department of science examination results, p117a-g, University of Westminster archives.

Table 4.4. shows that women's pass rate, 13.8 per cent of the total, was marginally higher than their participation in science examinations. This suggests that female students adapted well to study and were more successful than men although the rates are too small to draw any firm conclusions. It also confirms that women more commonly participated in science courses than they did in practical trade classes. This is interesting, given that the specially designed classes for young ladies were included in the practical trade figures. Women thus appear to have avoided these separate subjects, with eighty five per cent of those who passed examinations in practical trades or sciences being attracted to the department of science. This observation can be made with regard to students in general, and not just to women. Given the pledge of the polytechnic to provide technical and practical training in the late nineteenth century climate of overseas competition, a surprisingly small number of students opted for such courses, the majority seemingly choosing more theoretical options. However, the department of science did not only cater for students who wished to study pure science. The polytechnic prospectus for 1888 stated that many science courses were taught in part conjunction with practical trade courses, because there were many common areas of study.<sup>53</sup>

As with practical trade examinations, certain courses and categories in the department of science were more attractive to women than others. Table 4.3 shows that their greatest level of involvement was in the field of human biology where they accounted for 1,003 out of 1,404 students, or over seventy one per cent of the total. This is a significant finding, especially when it is borne in mind that human biology was statistically one of the more significant categories in the department. Within this category women were most dominant in subjects such as hygiene, 73.4 per cent of the total, and human physiology, 72.2 per cent. They accounted for a lower proportion of general biology students, and yet this was still by no means an insignificant figure at just over thirty one per cent. Other fields of large female involvement were botany at 52.5 per cent of the total and physiography which accounted for

50.7 per cent. The magazine Home Tidings in 1884 gave a description of physiography as a scientific study of the elements and the phenomena of nature, and thus was somewhat like a study of geology.<sup>54</sup> Physiography, and the other courses in which women comprised a majority such as hygiene, human physiology and botany were arguably more theoretical than the practical trade courses and other courses within the department of science such as building and machine construction, applied mechanics and heat engines, which all attracted a minute percentage of female students. However, other courses with tiny female participation rates were neither practical nor applied, for example theoretical organic chemistry only attracted 1.3 per cent of its students from the female membership.

The areas in which the lowest levels of female participation occurred were design and construction, mechanics and organic chemistry. Given that, according to Barbara Drake, engineering apprenticeships were not offered to women before 1918 it is highly unlikely that women would have been able to use a training gained at the polytechnic to obtain work in the areas of steam engineering, machine construction, applied mechanics, theoretical mechanics or geometry for example.<sup>55</sup> Thus their low level of participation in these areas is not surprising. It is more difficult to assess vocational opportunities for women who gained general science qualifications because, they did not always prepare a candidate for work in one specific field. One can only speculate as to the ways in which such skills might have been used. A qualification in chemistry had many potential uses such as chemical research, medicine, pharmacy and teaching for example, although most occupations followed by students with a chemical training would have been professional. This was also the case for those with qualifications in hygiene, physiology, botany, sound light and heat and mineralogy. The question therefore, is which professions were open to women?

Pat Thane has demonstrated that most professions were male dominated up to 1914 and that women did not begin to make a significant impression until the interwar years when, for example, the legal and accountancy professions were opened to them in 1919, and certain managerial professions also became accessible.<sup>56</sup> A general science organisation was the Literary and Philosophical Society, a prestigious and exclusive body which had an educational as well as a research role. Women were not permitted to become members, although they could attend selected meetings by the turn of the century if elected by the council.<sup>57</sup> Although membership of this society was not essential in order to practice a scientific profession, it is a good indication of the kind of resistance women faced in professional life in general, especially in the sciences. Although some scientific societies were open to women from their outset, others were closed to women until the twentieth century as outlined on page 39 above. In addition, through their own efforts, women gained admission to the British Association for the Advancement of Science in 1839, but they were not allowed onto the various committees or to hold office, in spite of intensive lobbying during the 1870s.<sup>58</sup> After the turn of the century, women continued to be poorly represented in the majority of scientific societies.<sup>59</sup> Further expansion in professional opportunity did not take place until the Second World War, and even then, as Pat Thane states:

‘In 1945 there were 102 female chartered accountants and 13,313 males; 325 female architects in a profession numbering 9,375; 261 female chemists among over 9,000; 7,193 female doctors and 37,143 males.’<sup>60</sup>

Thus, only 2.9 per cent of chemists, as late as 1945 were female. On this basis, it is hardly surprising that women between 1897 and 1911 did not study chemistry at the polytechnic in large numbers. Reader has shown that the Royal Society of Apothecaries, after 1865, tightened its rules to prevent the entry of women, after Elizabeth Garrett managed to gain admission via a loophole.<sup>61</sup> This was a profession which held obvious attraction for those

with a chemical training, and its closure to women is an example of overt restriction which may have deterred women from obtaining an education in chemistry. However, a range of more covert restrictions such as the marriage bar and low wages adequately explain why women declined to compete with men in some professions. For example, although the Royal Pharmaceutical Society was opened to women in 1879, they were not treated as equals within the profession. Women could not enter the building via the same entrance as men for example, and were generally isolated by male members.<sup>62</sup> This prompted the setting up of a separate 'Association of Women Pharmacists' in 1905, predominantly as a pressure group. The association attempted to gain greater recognition for qualified female pharmacists by inspiring hospitals to improve wages and conditions and also encouraging their members to join together and campaign for equal opportunities.<sup>63</sup> Holloway points out that even fully qualified female pharmacists who were members of the Royal Society, could generally gain work only in hospitals or as assistants. Very few managed to set up their own businesses, on the grounds that: 'Fathers seemed unwilling to invest capital to launch their daughters in business, but were not averse to using them as managers or assistants'.<sup>64</sup>

Although in theory the profession of pharmacy could be entered by women, in practice a large number of restrictions prevented women from succeeding in all areas of pharmaceutical work. According to the Englishwoman's Review, by 1907 there were only 150 female chemists in Britain, of whom the majority were engaged in hospital and dispensing work.<sup>65</sup> It is probably, therefore, no coincidence that large numbers of women participated in sciences such as hygiene and physiology which provided a basis of training for careers in nursing and midwifery and also the developing professions of health visiting and sanitary inspection which offered better opportunities to women. Health visiting developed very much as a female occupation which relied on the alleged 'ladylike qualities' of sensitivity and friendliness, whereas female sanitary inspectors were in much more direct competition with



men. Generally they held high qualifications, often degrees, and always sanitary certificates.<sup>66</sup> Davies argues, in fact, that female sanitary inspectors were generally more highly qualified than their male colleagues.<sup>67</sup> Both professions were important, the former in establishing a new area of work which brought the home and the health of the family into the public domain, and the latter in allowing women directly to compete with men in a profession which previously had been hard for them to access. Even amongst sanitary inspectors however, there was a clear sex division of labour where women were normally assigned to work with families and children whilst men more commonly dealt with 'drains, housing, workshops and factories'.<sup>68</sup> Numbers of women in these professions by 1911, were still fairly small, although growing.

Reader shows that, nursing, midwifery and teaching were the only professions in which women constituted a majority before the First World War.<sup>69</sup> The 1911 census showed that there were 187,283 female teachers in Britain and 83,662 midwives and nurses.<sup>70</sup> This suggests that women did not chose particular science options purely because they were more theoretical or more 'suitable', but because they could develop careers in these areas without facing male competition, and numerous barriers. As late as the 1950s and 60s this attitude still prevailed. Pat Thane refers to research carried out by Nancy Seer in the 1950s which revealed that most female science graduates opted for careers in teaching, and in a few cases industrial research. The study stated:

'Competing with men was not a prospect which attracted many of them. They were chary of entering into a situation in which they would have to push in order to gain promotion....not one girl expressed enthusiasm for breaking down prejudice simply because it was there'.<sup>71</sup>

It is certainly not sufficient to regard low levels of female participation in technical and scientific employment as a result of inadequate provision of training and education, and the

responsibility does not lie solely with institutions like the polytechnic. In contrast, discrimination against women in the labour market had the result that some forms of scientific training were unhelpful. Additionally, as Gladys Carnaffon has pointed out, a definition of 'technical employment' which ignores areas such as commerce and languages is negative, and results largely from the fact that technical work is generally perceived in 'male terms', although commerce was of vital importance to economic performance, and many women participated in this area.<sup>72</sup> Unfortunately, no examination results for the department of commerce at the polytechnic have survived, and thus it is not possible to judge the extent of female involvement. Given that female rates of participation in science and practical trade classes were much lower than those outlined by the L.C.C. for the year 1908-1909, it is conceivable that a large number of women took part in commercial training.

The science subjects documented in table 4.3 did not prepare students only for professional careers. An interesting finding was that women accounted for nearly thirteen per cent of all agricultural examinees at the polytechnic. One might expect agriculture to have been a male dominated occupation around the turn of the century. Indeed, the Englishwoman's Yearbook for 1890 stated that traditionally this had been deemed an 'unfeminine' area of work'.<sup>73</sup> However, both this journal, and the Englishwoman's Review ran articles between 1890 and the early 1900s showing that a large number of women were gaining posts as gardeners, horticulturalists, or setting up privately as market gardeners.<sup>74</sup> Apparently, the demand for women gardeners had become so great by 1909, that 'at least one well known college could not keep pace with the number of female students applying for training'.<sup>75</sup> Women could command salaries of up to £100 per annum, including board and lodging, in 1901, a comfortable income, although, crucially, the top salary for a man carrying out the same work was around £300.<sup>76</sup> Compared to other occupations for women however, agriculture and

gardeners were probably attractive alternatives, although it is surprising that a study of agriculture attracted any interest in central London.

Unlike the City and Guilds results, there were very few science examinations which did not attract any female candidates, even though many had a very tiny percentage participation. This was presumably because science courses did not stipulate that trade participation was a necessity for enrolment. Although most women avoided courses in which later professional openings would be difficult to achieve, a handful participated in most courses because, as Carol Dyhouse has shown, they could normally gain work teaching their subjects:

‘There were pitifully few occupational niches open to women who had completed their studies in higher education. Most of those who needed to earn their own living either chose, or had no choice, but to return to schoolteaching.’<sup>77</sup>

It seems, in the light of numerous hindrances to women in the areas of theoretical and applied science, that women constituted a surprisingly large proportion of total science candidates at the polytechnic, twelve per cent of those who sat examinations, and 13.8 per cent of those who passed. Their subject choices also indicate that they intended to use their qualifications for practical purposes. The discussion finally turns to female participation in the department of art. This section is based on a sample, because female education in arts subjects is not within the original remit of the thesis. However, as twenty six per cent of polytechnic members were apparently female, and in 1908-9 women accounted for 44.3 per cent of all students, a large number still have to be accounted for who do not appear in the figures for science and practical trade examinations. As already suggested, a number were probably involved in the department of commerce, but no records exist to support this. In addition, some may have participated in the department of art.

## DEPARTMENT OF ART EXAMINATION RESULTS

The figures of examination passes and failures in the department of art are presented in Table 4.5. The results are based on three single year studies, 1900, 1905 and 1910, and therefore cannot be compared at an aggregate level with the figures in tables 4.2 and 4.3. However the percentage of students who were female can usefully be compared with the findings from the practical trade, and science examinations.

**Table 4.5 DEPARTMENT OF ART EXAMINATION RESULTS, 1900, 1905, AND 1910.**

Course	Total	No. of females	Female % of total
<b>Drawing</b>	<b>769</b>	<b>305</b>	<b>39.7</b>
Drawing from antique	71	32	45.1
Drawing from life	102	44	43.1
Drawing in light and shade	162	66	40.7
Freehand drawing	193	64	33.2
Geometrical drawing	44	19	43.2
Model drawing	197	80	40.7
<b>Design</b>	<b>360</b>	<b>99</b>	<b>27.5</b>
Architecture	136	3	2.2
Design	110	57	51.8
Modelling design	6	2	33.3
Perspective	108	37	34.3
<b>Modelling</b>	<b>78</b>	<b>24</b>	<b>30.8</b>
Modelling from antique	13	7	53.8
Modelling from cast	24	6	25.0
Principles of ornament	17	9	52.9
Historic ornament	24	2	8.3
<b>Painting</b>	<b>49</b>	<b>29</b>	<b>59.2</b>
Painting from still life	37	23	62.2
Painting ornament	12	6	50.0
<b>Total</b>	<b>1,256</b>	<b>457</b>	<b>36.4</b>

**Source:** Department of Art Examination Results, p116d, p117a, and p117e, University of Westminster Archives.

Table 4.5 demonstrates that a large percentage of students in the department of art were female, 36.4 per cent of the total. This explains where some of the female members,

previously unaccounted for were located at the polytechnic. It also implies that the view that women were attracted to fine arts as an area in which they could develop amateur interests holds some credibility.<sup>78</sup> However, a breakdown of the figures, and a closer look at participation in individual courses shows that the type of art classes in which women comprised the larger proportions, were not necessarily non-vocational. In the category of drawing, women were 43.2 per cent of the total in 'geometrical drawing', but only 33.2 per cent in 'freehand drawing'. It is difficult to classify certain courses as more practical than others in the department of art, because, like science qualifications, the skills acquired were not necessarily connected to one specific trade. However, it is probable that a course in geometric drawing was relevant to a number of industrial occupations, and perhaps more so than one in freehand drawing. Similarly in the category of design, women comprised very significant proportions in particular subjects. The overall percentage of women in the category was low, because the largest course within this group, architecture, was rarely studied by women, only three of 136 students recorded were female, a mere 2.2 per cent. An extract from the Polytechnic Prospectus for the academic year 1901-2 provides an insight into these small female figures:

'(The course in architecture) is formed for the purpose of affording instruction to youths and young men who intend entering architects', surveyors' or builders' offices, or following any of the many designing and constructive occupations. The course will .... include instruction .... as required by the R.I.B.A.'<sup>79</sup>

Aside from the use of masculine phraseology, the fact that this course was so closely connected to careers in architecture, surveying and building, and also to the Royal Institute of British Architects, which had only five female members by 1922,<sup>80</sup> is explanation enough for a low rate of participation. There were no official restrictions on women who attempted to join the R.I.B.A., and the first, Ethel Mary Charles was successful in 1898.<sup>81</sup> However, the social climate in the late nineteenth and early twentieth centuries was such that entering

architecture as a profession was not deemed 'respectable' for young ladies. As Wigfall states: 'Working, as the architect did, alongside the builder, it was inconceivable that a woman should contemplate taking on such a job'.<sup>82</sup>

This explains why as late as 1922, such a tiny number of women entered the profession of architecture and therefore why women participated in such small numbers in the corresponding course at the polytechnic. In contrast, in the design course, women comprised nearly fifty two per cent of the total, the majority of all students. The placing of this course within the department of art should not be taken to imply that it was a non-vocational subject. The polytechnic prospectus for 1888-9, showed that a major aspect of the course in design was to meet: 'the requirements of apprentices and artisans connected with the wood carving trade'.<sup>83</sup> Therefore, women were engaged in relatively practical areas of study, albeit in the department of art, and it is certainly misleading to assume that their interest was merely dilettante. Although the volumes of examination results referred to a 'department of art', the polytechnic prospectus named the department the 'School of Practical and Technical Art'.<sup>84</sup> This title is important, because it shows that art and design courses at the polytechnic were often applied and did not offer only a 'liberal education'. This strengthens the observation that courses which fell outside the department of practical trade should not be assumed always to have been non-vocational.

Women also participated in a number of less technical art courses, constituting, for example, over sixty two per cent in 'painting from still life'. However, there is no obvious trend which indicates that women participated in these courses to a greater degree than men, who accounted for a large majority in courses such as 'perspective' and 'historic ornament' for example. A qualification in a subject such as 'painting from still life' may also have had vocational uses. During and after the 1880s, 'art pottery' workshops were flourishing.

Drawing on clay was practised at the Doulton factory by several artists trained at the Lambeth School of Art,<sup>85</sup> and it is quite conceivable that those trained at the polytechnic at Regent Street were able to use their skills in a similar manner.

It has been shown that women accounted for a significant portion of polytechnic members, over twenty six per cent, and that these figures underestimated their participation as students, which between 1908 and 1909 was over forty four per cent. Of this female body, the largest proportions were to be found in the school of technical and practical art and in certain science subjects. This can be explained largely by the fact that a number of barriers external to the college, particularly within industry and professional societies, meant that certain courses were of little practical use to women. The technical trade courses which were designed specifically for young women such as dressmaking, millinery and cookery, attracted surprisingly small numbers of female candidates in comparison to courses in the departments of science and art. It is also conceivable that women's involvement in the department of commerce was large, given that this was an area of employment which was rapidly expanding for them,<sup>86</sup> and that the participation of women in science and art subjects was well below their large significance as students at Regent Street as reported by the L.C.C. for 1908-9. It appears that women avoided the classes which were specifically designed for them, because they were not content to pursue traditional careers. It does not seem to have been the case that women chose specific options because they were deemed 'suitable', or because they were non-vocational, although their participation in traditionally male areas of industrial training was very small.

A useful means of ascertaining whether women sought education for vocational reasons is to consider the extent to which they were already engaged in employment whilst studying at the polytechnic. Unlike U.C.L., students of the polytechnic were normally enrolled on a

part-time basis, studying in the evenings only, and therefore potentially working during the day.

A small sample of the occupations of college members was taken from the candidate books, for both males and females for the year 1907. This year was chosen, because women made up 26.2 per cent of all students at this time, which was close to their average for the nine year period 1905-1913. The details of twenty five men and twenty five women were recorded, by noting the first and last name that appeared in each month of the year, with the exception of September when three names were taken because the largest number of members enrolled in this month. Only four of the twenty five women were not occupied, and one was listed as a student. The remaining twenty all carried out some kind of paid work. This implies either that they desired their training in order to become more skilled at their current trades, or that they aspired to acquire new qualifications, so that they could move into different occupational sectors. The fact that so few could claim to be 'students' or 'non-occupied' however, shows that employment prospects were one of the key motivations for women who attended the polytechnic. The figure for men was twenty three occupied and two unemployed for the same period, a slightly higher proportion in work, but not a radically different one.

The fact that eighty per cent of women in the polytechnic sample were employed, suggests that they were of a different social status to women who attended U.C.L. Most women who studied at the polytechnic had to work to provide themselves with incomes, and probably had to make greater personal and financial sacrifices than those women at U.C.L. in order to gain an education. The polytechnic prospectus for the academic year 1888-9 showed that in order to gain membership a basic registration fee of one shilling was payable by both males and females as a one-off enrolment cost. In addition, a subscription fee of three shillings per



quarter for men, and 1s 6d for women was required.<sup>87</sup> The fee was lower for women, because their leisure and recreational facilities were not very extensive. Course fees were then payable above these other costs, although students could pay for a course alone, and choose not to 'join' the polytechnic if they were not interested in social activities. A sample of courses was taken from the prospectuses to show the cost of an education at the polytechnic, and to demonstrate the type of students who could afford to attend. Three full-time day courses, and three evening classes were chosen, and were spread between the various departments at the polytechnic. The day classes were mechanical and civil engineering and photography, and the evening classes, brickwork and masonry from the technical trade department, elementary botany from the department of science, and shorthand from the department of commerce. The fees for these courses are outlined in table 4.6 below:

**Table 4.6 COST OF SELECTED POLYTECHNIC COURSES, 1888-1914, PER QUARTER**

Course	1888-9	1901-2	1906-7	1909-10	1913-14
<b>Full-Time</b>					
Mechanical engineering	£5,5s	£5,5s	£5,5s	£5,5s	£7,7s
Civil engineering	£7,7s	£7,7s	£7,7s	£7,7s	£7,7s
Photography	£4,4s	£4,4s	£4,8s	£4,8s	£4,8s
<b>Part-Time</b>					
Brickwork and Masonry	- 5s	- 5s	- 7s 6d	- 10s	- 15s
Elementary botany	- 5s	- 5s	- 5s	- 5s	- 5s
Shorthand (Beginners)	- 5s	- 5s	- 7s 6d	- 7s 6d	- 7s 6d

**Source:** Polytechnic prospectuses 1888-9, 1901-2, 1906-7, 1909-10 and 1913-14, University of Westminster archives.

Unfortunately, after 1888, the polytechnic prospectuses no longer provided an outline of course content, therefore, it was not possible to explain whether the price increases for shorthand and especially brickwork and masonry classes after 1906 resulted from changes

in course structure. In both cases, the tutor did not change in 1906, and neither did the length of class time - which remained two one hour sessions per week.<sup>88</sup> It remains difficult, therefore, to explain price rises other than by assuming they occurred when prices began to increase in general after about 1900, although the cost of courses such as brickwork and masonry rose proportionately much more than the general price level. In spite of the rising cost of some college courses, the fees at the polytechnic were not so high as those at U.C.L. Even the daytime courses which cost a student approximately twenty to twenty eight guineas per annum, were lower than the price of degree courses at U.C.L., which were anything between £30 and £40 for one year's study. However, to suggest that the fees of full-time courses at the polytechnic could be afforded by working families would be misleading. Average earnings were around £77 before the First World War,<sup>89</sup> and for families who were in this sector of the population, sending a son or daughter to study at the polytechnic on a full-time basis would have taken up well over one quarter of family income. Most full-time students at the polytechnic would for this reason have come from at least lower-middle class, families. The role of the polytechnics as institutions for the training of working people is, on this basis, somewhat dubious.

However, evening instruction was much more affordable, and it is arguably this type of education which was intended to be the most practically useful for young workers. The fees for the three courses listed, ranged from five to fifteen shillings per quarter, which meant annual fees of £1 to £3. For those earning average wages, such fees accounted for only two to four per cent of annual earnings, but for those earning less, an education at the polytechnic would probably have been regarded as a luxury. In conclusion, the polytechnic courses were available to a wider section of the community than those at University College. However, full-time instruction was still beyond the reach of most working families, and even evening instruction could only be afforded by craftspeople or artisans or more probably, their parents.

It is less likely that labourers or unskilled workers could fund an education for their children at the polytechnic.

The following chapter considers the occupations and careers of women who had studied at the polytechnic, and had graduated from U.C.L. This offers further insights into their social status, and their motivations for choosing certain educational options. In addition, it aids an understanding of the relationship between the levels of technical training and scientific education achieved by women, and the contribution to economic activity which they were able to make as a result.

## NOTES TO CHAPTER FOUR

1. E M Wood (1965), p. 49.
2. W Abbot and A Walker (1970), pp. 1-2.
3. Ibid, p. 2.
4. E M Wood (1932), p. 85.
5. Ibid, p. 90.
6. Polytechnic prospectus, 1888-89, p. 13, University of Westminster Archives.
7. E M Wood, (1932), p. 94.
8. W Abbot and A Walker, op.cit, p.5.
9. Royal Polytechnic programme, 1873, R48, University of Westminster Archives.
10. Polytechnic Magazine, 1888, Vol. 12, No. 235, 7 Jan., p. 1, University of Westminster Archives.
11. Ibid, No. 238, 28 Jan., p. 33, University of Westminster Archives.
12. E M Wood, (1932), p. 85 and p. 90.
13. See for example, Polytechnic Magazine, 1890, Vol. 16, No. 338, 2 Jan., pp. 11-15, University of Westminster Archives.
14. Polytechnic prospectus, 1901-2, No. 1, pp. 44-5, University of Westminster Archives.
15. M Argles (1964), p. 39.
16. E M Wood (1965), p. 65.
17. For a list of these institutions, see Englishwoman's Yearbook (1900), p.36.
18. M Locke (1978), pp. 12-14.
19. Ibid, p. 17.
20. S J Teague (1977), p. 25.
21. M Locke, op.cit, p. 25.
22. LCC, Education Committee Minutes (1904), p. 1444, Greater London Record Office.
23. Ibid (1907), p. 1555.
24. S J Teague, op.cit, p. 25.
25. LCC, Education Committee Minutes (1910), p. 679, Greater London Record Office.

26. City and Guilds examination results 1904, p119f, University of Westminster Archives.
27. Polytechnic prospectuses, 1901-1908, p. 15, University of Westminster Archives.
28. C Dyhouse (1977), pp. 21-22.
29. E Cadbury et al (1909) p. 46.
30. Ibid, p. 46.
31. Ibid, p. 47.
32. Polytechnic prospectus, 1888-89, p. 101, University of Westminster Archives.
33. Ibid, p. 107.
34. P.R.O., LAB 2/269/T.7073, Ministry of Labour report (1920).
35. B Drake (1918), p. 8.
36. Ibid, p. 11.
37. P.R.O., LAB 2/1226/ED937, Ministry of Labour deputation (1920).
38. E Cadbury et al, op.cit, p. 81, p. 99 and p. 102.
39. C Black (1915), statistics pp. 16-100.
40. Ibid, p. 16.
41. E Cadbury (et al) op.cit, pp. 51-70.
42. Ibid, p. 85.
43. F Hunt (1986), p. 85 and p. 89.
44. Ibid, p. 76 and p. 86.
45. E Cadbury, op.cit, p. 40.
46. A Clinton (1984), p. 55.
47. M Daunton (1985), p. 219.
48. Ibid, p. 197.
49. Englishwoman's Yearbook (1890), p. 120.
50. M Daunton, op.cit, p. 221.
51. M Pritchard (1987), p. 214.
52. M Bateson (1895), p. 83; Englishwoman's Yearbook (1900), p. 66.
53. Polytechnic prospectus, 1888, p. 181, University of Westminster Archives.

54. Home Tidings, 1884, Vol. 5, No. 66, 11 Oct., pp. 311-12, University of Westminster Archives.
55. B Drake, op.cit, p. 11.
56. P Thane (1992), p. 303.
57. G W Roderick and M D Stephens (1972), pp. 140-1.
58. M Alic (1986), pp. 179-81; Englishwoman's Review (1901), pp. 47-8.
59. Englishwoman's Review (1903), p. 121.
60. P Thane, op.cit, p. 303.
61. W J Reader (1966), pp. 175-6.
62. S W F Holloway (1991), pp. 264-5.
63. Ibid, p. 267.
64. Ibid, p. 265.
65. Englishwoman's Review (1907), p. 141.
66. C Davies (1988), pp. 42-7.
67. Ibid, p. 48.
68. E Morley (1914), pp. 221-7.
69. W J Reader, op.cit, p. 172.
70. E Morley, op.cit, p. 298.
71. P Thane (1991), p. 201.
72. G Carnaffon (1988), pp. 68-78 and p. 82.
73. Englishwoman's Yearbook (1890), pp. 120-1.
74. Ibid; (1900), p. 52; Englishwoman's Review (1901), p. 210.
75. Englishwoman's Review (1909), p. 206.
76. Ibid, (1901), p. 211.
77. C Dyhouse (1984), p. 53.
78. J Burstyn (1980), pp. 139-40.
79. Polytechnic prospectus, 1901-2, pp. 20-21, University of Westminster Archives.
80. V Wigfall (1980), p. 51.
81. A Mace (1986), p. 285.

- 82. V Wigfall, op.cit, p. 51.
- 83. Polytechnic prospectus 1888, p. 206, University of Westminster Archives.
- 84. Ibid, p. 203.
- 85. G Bemrose (1955) pp. 41-2.
- 86. G Carnaffon, op.cit, p. 82.
- 87. Polytechnic prospectus, 1888, p. 25 and p. 35, University of Westminster Archives.
- 88. See for example: Polytechnic prospectus, 1906-7, p. 18, University of Westminster Archives.
- 89. E Hobsbawm (1986), p. 167.

## CHAPTER FIVE:

### WHAT NEXT? THE CAREER PROSPECTS OF WOMEN EDUCATED AT U.C.L. AND TRAINED AT THE POLYTECHNIC BEFORE THE FIRST WORLD WAR

In 1895, an article was published in the journal The Nineteenth Century which considered the effect of university education on the long-term career prospects of upper middle-class women. The colleges included in the study were Newnham, Girton, Somerville, Royal Holloway College and Alexandra College, Dublin. The author, Alice Gordon asked the question: 'does this course of training really, ultimately make women's lives freer and happier?'<sup>1</sup> The results of the survey were grouped together for analysis, and showed that the total number of females who had graduated from these five colleges between the 1870s and 1893 was 1,486. Of these, 680 (or forty six per cent) were engaged in various kinds of teaching, 208 (or fourteen per cent) were married, eleven were doctors and medical missionaries, and of the remaining fourteen who were in paid work, two were nurses, eight or nine were government workers, one was a bookbinder, one a market gardener and one a lawyer.<sup>2</sup> The woman who gained a position as a lawyer worked as a solicitor's partner in Bombay. This explains how a woman, in this case educated at Somerville, gained entry to a profession which was still closed to women in Britain.<sup>3</sup> The remaining women may well have done worthwhile voluntary and other kinds of work or remained unemployed, but as there were no given details of these women it is impossible to know.

The conclusion of the study was that university education did little to alter the career prospects of most women, but that it enlarged the sphere of traditional female professions such as teaching in particular. However, the figures indicated that a large percentage did not marry after leaving education, which demonstrates that women who went through university tended away from 'traditional' lifestyles in at least one respect. Martha Vicinus has pointed out that many women who attended university, and specifically the women's colleges did so because they did not have conventional expectations, and wished to lead independent



intellectual lives. A number in fact, chose not to marry, but rather developed lifelong female friendships which were sometimes erotic in nature.<sup>4</sup> It is perhaps not surprising then, that of a cohort of university educated women who had all attended single-sex colleges, only fourteen per cent chose to marry. In addition, Gordon's article was published in 1895, only two years after the last group of women in her study graduated. It is conceivable that a number of these graduates had not married by 1895, but went on to do so at a later date, especially given that, as Anderson has demonstrated, from the mid to late nineteenth century, it was not uncommon for women to marry fairly late in life for the first time, the typical age span of their age at marriage being from eighteen to forty four.<sup>5</sup>

It is not made explicit by Alice Gordon's survey whether any of those who married also carried out paid employment. The operation of marriage bars in certain professions, especially in teaching where the ban on married women was not lifted until 1944, might lead one to expect that such a possibility was minimal. Marriage bars in teaching were not universal however. Although most literature highlights the closure of the teaching profession to married women from the 1890s, Dina Copelman has shown that there was considerable resistance to such restrictions, especially in London. Here, the teaching profession as a whole, and women teachers in particular fought the policy, and the London education authorities were reluctant to enforce marriage bars because: 'they never found conclusive evidence that they (married women) were any less efficient than unmarried teachers'.<sup>6</sup> If the occupations of these married women had been explored, it is conceivable that some interesting information might have been discovered.

As early as 1866, Emily Davies argued that educated women could combine work and marriage, on the grounds that most wealthy families employed domestic servants and nannies, and thus educated, upper-middle class women who wished to work outside the home need

only spend around one hour per day on housekeeping matters. In addition, she pointed out that professional women, for example doctors, often married men of the same professional background as themselves, and thus set up in partnership with them, or worked as full-time assistants.<sup>7</sup> Davies' vision was progressive, she even confronted the gendered notions of 'male' and 'female' work. It would be incorrect to suggest that her views were widely accepted, but the points she made were valid. If a woman who was well educated was desirous of entering professional employment and was fortunate enough to escape the marriage bar, then in theory, she was able to do so. Many in practice were prevented by social convention and employer prejudice from doing this.

Poor employment opportunities were not the sole cause of a disappointing range of activities embarked upon by university educated women. Joyce Antler has suggested that family ties explained why many felt unable to pursue careers after graduation. She argues that a battle was waged between a 'social claim', that is the responsibility that women felt to the world at large, and a 'family claim', where parents expected women to return to their domestic roles as daughters and helpers at home. For many women, teaching was a 'compromise' profession, which allowed them to find work close to their families and still live at home.<sup>8</sup> Although Gordon's study indicated that teaching was the main occupation pursued by university-educated women, the evidence is that traditional roles were not dominant. The type of teaching in which women are believed to have participated prior to the opening of higher education was at primary level teaching young children, or as private governesses,<sup>9</sup> although there were a number of openings in girls' private schools at an early date. Gordon's study shows that university education did much to alter the careers of women who had received a higher education, because it enabled them to enter different levels of teaching, essentially in secondary schools, previously dominated by men. This is complicated by the rise of the Girls Public Day School Trust (G.P.D.S.T.) which created a new demand for

female high school teachers. It was not necessarily women's higher education that altered their prospects then, nor was it the case that all were in competition with men, but that there was an increased supply of higher level teaching posts. Table 5.1 gives details of the particulars of the women of Newnham college who were recorded as teachers. In total, 720 women left Newnham in the period 1871-1893, therefore only just over half went into the teaching profession.

**Table 5.1 FORMER STUDENTS OF NEWNHAM COLLEGE, CAMBRIDGE WHO ENGAGED IN TEACHING AS A PROFESSION, 1871-1893.**

Headmistresses	75
Assistant mistress	170
Lecturers	22
Principal of the Cambridge Training College	1
Visiting teachers	23
Teachers under county or borough councils	4
Teachers in the colonies and America	27
Private governesses	23
Teachers taking an interval of rest	14
Teachers looking for posts, or unknown	15
	374

**Source:** A Gordon, The after-careers of university educated women (1895), p. 956.

A large number of these women teachers held positions of high responsibility. Seventy five were headmistresses, accounting for twenty per cent of women from Newnham who embarked on teaching careers. The category which one would expect to have encompassed elementary school teachers, 'teachers under county or borough councils', accounted for only four and in addition two of the headmistresses and thirteen of the assistant mistresses were described as working in elementary schools or training colleges. Thus, at most 5.1 per cent of the Newnham women entered elementary schools at various levels, and it does not appear that the teaching of young children was particularly favoured, although of course prior to 1918 not all children who attended elementary schools were necessarily very young. Twenty two women secured posts as university lecturers, and it is certainly misleading to group these

women with elementary teachers or governesses and claim that women's lives changed little as a result of their education. In fact the number of lecturers in table 5.1 is comparable with the number of private governesses, which suggests that the university education these women had received indeed allowed a significant change to take place in the types of teaching which they were able to enter. Prior to the advent of higher education for women, one would expect that the proportion of private governesses to other types of teachers would have been much higher. Maxine Berg has provided evidence that at the London School of Economics, of 200 teaching staff between 1895 and 1932, forty three were women although it is not clear how many of these secured their posts in the pre-First World War period.<sup>10</sup> Her findings indicate that some educated women were establishing themselves in new branches of teaching. However, this was not universal.

There is no clear indication of the number of female academics in Britain before the war, although fairly detailed studies have been carried out. Dyhouse demonstrates the difference of opinion on this subject by contrasting the work of Rendel and Perrone.<sup>11</sup> Rendel's figures were based on the Commonwealth Universities Yearbook for 1914 which listed only women who held recognised lecturing posts,<sup>12</sup> whilst Perrone's analysis was broader, and included teachers in women's colleges, non-recognised teachers of the university of London, demonstrators and teaching assistants.<sup>13</sup> Rendel's figures are thus rather too low, whilst, Dyhouse states, Perrone's may be too high, because they contain a number of women in junior posts, who would not necessarily become fully established academics.<sup>14</sup> However, Perrone demonstrates that at U.C.L. four of seven demonstrators proceeded to gain full-time academic posts, one of whom, Ethel N Thomas became a reader.<sup>15</sup> Her achievements are documented in appendix B. Thus, it would be unreasonable to exclude these women from such a study. According to Rendel's data, only five per cent of university staff were women by 1912-13,<sup>16</sup> and Perrone's data shows that by 1930, this figure was fourteen per cent.<sup>17</sup>

Unfortunately the dates do not coincide. Rendel's figure for 1930 was just under ten per cent, which suggests that Perrone's calculation for 1912-13 might have been around nine to ten per cent. The implication is that the L.S.E.'s employment of academic staff was atypical, a point which has been made by Dyhouse.<sup>18</sup> However, the following section will show that a significant proportion of U.C.L.'s science graduates embarked upon lecturing careers after completing their education. Given the existence of restrictions such as the marriage bar and the pressure placed on young women to find work close to their family homes, such findings are surprising.

In addition to educated women who became teachers, Louis Haber has located a number who succeeded in entering scientific professions in the late nineteenth century, but for a variety of reasons have been 'hidden from history'. In 1888, the US government credited women with more than 1,000 patents, including the pneumatic tyre, air cooling fans, the snow plough and a fire escape. Haber does not outline the nationalities of these women, however she does make the general comment that across the world, women scientists have rarely been recognised in text books, which has given the impression that 'they do not exist'. This discrepancy is in part because female inventions were often registered under the name of a husband or male colleague which perpetuates an incomplete image of women's involvement in the past.<sup>19</sup>

Howarth and Curthoys note that the socio-economic backgrounds of educated women are of fundamental importance in explaining the extent to which women succeeded in following careers. They found that girls from private schools were strikingly more likely to marry than those from secondary schools which offered free scholarship places from 1907. Usually the latter opted for paid employment. The daughters of academics, clergy, schoolmasters and especially those of the lower middle classes were least likely to marry and usually took up

employment, which was almost certainly an indication that their families were not particularly affluent, whilst those from commercial or land owning families more frequently married and chose not to take up paid work.<sup>20</sup> They indicate that a consideration of the effects of a higher education alone on women's career prospects is too narrow, and that the range of factors influencing women's opportunities in later life were complex and diverse. Nevertheless, the following two sections are interested primarily in the occupations gained by women following their education at U.C.L. and the polytechnic at Regent Street respectively. The aim of this section of the research is to ascertain the extent to which women used their qualifications to become economically active, to discover the range of careers in which they engaged and to comment on whether this altered their lifestyles, or offered anything new to the economy.

#### **FEMALE SCIENCE GRADUATES OF U.C.L.**

This research was based upon data which outlined the occupations and activities of female science graduates of U.C.L. after they graduated. Although it would have been interesting to consider all former students of the college, this was not practical within the limits of time constraint. In addition, a study of female science graduates enabled continuity of analysis with the sample of women referred to in chapter three, and an in-depth study of the characteristics of one group of female students. Ascertaining the achievements of women who were highly educated in the sciences also contributes to the debate surrounding the ability of British industry to attract trained and educated people.

The first point of reference was a series of college index cards, each of which provided a number for the file of a former student of U.C.L. Unfortunately, these files were only compiled for students who left the college in the years after 1900; for those who had attended

before 1900 there was very little material available. On a handful of occasions, the index cards themselves gave brief details of later economic, or other, activity, but there was no continuity in this occurrence. One hundred and sixty two women graduated in science between 1881 and 1913, and of these, seventy had an index card only and no additional file, leaving ninety two with some form of official record. Of those with an additional file, only twenty seven per cent had a record of any activity after graduation. This is a small figure which results from the fact that U.C.L. lost touch with most graduates unless they re-entered U.C.L. or the University of London to register for a higher degree or further qualification. Some references to external employment were occasionally provided, but generally only when the graduate had also returned to London University to study for a higher degree. Unless women returned, it seems that contact was lost, and it is rare for the college to have any data on later employment or qualifications gained from other institutions. This suggests that there will be a huge underestimation of the achievements of science graduates, unless one is to assume that those who did not return to U.C.L. or the University of London did not take part in any form of non-domestic activity, which seems highly improbable. That twenty seven per cent of those with a student file have some record of post graduate achievement is, given the above constraints, quite surprising.

The percentage of graduates whose only record of achievement appeared on an index card was even smaller, nineteen per cent. This figure should not be considered conclusive however, on the grounds that the index cards were not designed to record such details. Where references were given they were ad hoc, handwritten and not the result of systematic enquiry. The unreliability of this recording method can be demonstrated by the fact that only a handful of the women who graduated after 1900 and had student files which registered their achievements, also had information recorded on the index cards. In addition, where information was given, it was never identical to that in the files. This implies that in all

probability more female science graduates remained active after their graduation than is indicated by this study. However, data which indicates what they might have done is lacking, and this must remain speculative.

The total percentage of women who had a record of activity on an index card or in a student file, was 23.5 per cent. Irrespective of the discrepancies outlined above, this figure is not insignificant, and represents nearly a quarter of U.C.L.'s female science graduates. Eight graduates were also documented in Who Was Who, seven of whom had information in the student records, but one who did not. Other directories proved useful in tracing these female graduates such as the Women's Who's Who, published by Shaw in 1933 and 1934, Hutchinson's Women's Who's Who for 1934, The Directory of Women Teachers for 1914 and 1927 and Who's Who in British Science which was published in 1953. Other directories were consulted, but offered no details regarding these women, such as Patricia Sweeney's, Biographies of British Women. Nevertheless, the number of women with a record of post-graduate achievement increased significantly as a result of this exercise. A contemporary journal, The Englishwoman's Yearbook introduced two new sections in 1896 entitled 'distinguished women of science' and 'distinguished women of medicine'. These were presented every year until 1916 when the journal appears to have gone out of publication. Significantly, a number of U.C.L.'s female science graduates appeared in this source. Finally, U.C.L.'s own college calendars for the years 1880-1940 were consulted, because they provided lists of academic staff, and a number of former students progressed to take up paid employment with their respective science departments at the college. Interestingly, the student records did not always provide this information, even though these women were working at U.C.L., and a number also failed to be captured by the directories already mentioned. Much important information about the activities of educated women has thus not been incorporated into public records which suggests that women's roles are generally



underestimated. If it had been possible to trawl through staff lists of other British universities in search of U.C.L.'s female science graduates, some interesting details may have been found. However, as a result of these exercises, sixty six, or just under forty one per cent of the women who had graduated in science were accounted for, a significant proportion given the data constraints, and the difficulties in attempting to trace details of women's lives.

Appendix B provides a full breakdown of the later achievements of these women and shows that a significant proportion went into very high level occupations. This itself indicates that many women were keen to pursue difficult goals, and not content to let their qualifications go unused. Their achievements can be broken down into two categories: academic work and other employment. Although there were many overlaps between the two, I have chosen to class further courses of study and fellowships as academic, and teaching, lecturing, industrial work, administration and publications as other employment. The latter usually generate some form of income, whereas the former do not in the short run.

An extremely large proportion of the graduates took part in academic activities, many of them gaining higher degrees or post-graduate training. Thirty seven of the sixty six listed in appendix B, or fifty six per cent, held some kind of further qualification. If taken as a percentage of all female science graduates, some of whom do not appear in appendix B because they were not traced, those who took part in academic activities still accounted for twenty three per cent. Given that this is a minimum, it is a very significant figure. Of those with further qualifications, twenty four had doctorates, DScs, PhDs or MDs, or in some cases a combination of more than one of these, thus accounting for sixty five per cent of those for whom we have details who had further qualifications. Those remaining held either MScs, a second degree in medicine, taken after an initial BSc, or some kind of post-graduate

certificate. Eight of those observed had successfully completed a medical training, many obtaining doctorates (MDs). This was possible because the University of London School of Medicine, unlike U.C.L.'s own medical department, was open to women throughout the period of this study.<sup>21</sup> This shows that there was demand by women to study courses which traditionally had been closed to them, but also that women were pushing for practical training in addition to academic education. The extent to which these women gained medical degrees for vocational reasons is shown in appendix B where all eight took up careers which in most cases were medical. Four became borough or school medical officers during the 1920s, two of whom had previously, during the First World War been hospital doctors. This is a good example that, as Leneman suggests, during the war, opportunities for medical women broadened, but once peace resumed, they were forced to return to less well paid and prestigious posts.<sup>22</sup> Gladys Miall-Smith for example was assistant surgeon at the Scottish Women's Hospital in 1918, then in 1920 became assistant medical officer for St Pancras. However in 1922, possibly in response to cutbacks of women staff at St Pancras,<sup>23</sup> she successfully set up as a general practitioner, demonstrating an ability to make the most of her qualifications in a difficult climate. Of the others, one, Annette Benson, rose to the heights of first physician at a Bombay hospital, one became a lecturer, another, an active propagandist for lunacy reform and only one undertook voluntary work.

Three other women returned to U.C.L. to take further courses. Mabel Reaney undertook a course in applied statistics for teachers,<sup>24</sup> another, numbered 53 in appendix B, a course in phonetics for missionaries<sup>25</sup> and Ethel Frodsham the 'Chadwick training course in school hygiene'.<sup>26</sup> The Chadwick training course was practical, providing for the needs of prospective sanitation and school workers.<sup>27</sup> It seems unlikely that women would have undertaken these courses, unless they intended to use their acquired skills in employment. Appendix B shows that number 53 became a missionary, Ethel Frodsham had a mixed career

of school teaching and teacher training and Mabel Reaney used her course to guide her into a teaching post at a secondary school.

In addition to achieving such high profile post-graduate qualifications, many of these women undertook other, often connected, activities such as publishing research papers, accepting fellowships or memberships of professional bodies, and sitting on academic boards. A large number also used their higher qualifications to further their employment. Sixty three of the sixty six graduates in appendix B had a record of involvement in some kind of employment. At ninety five per cent of the total, this is not only impressive, but signifies that these women were certainly career minded and not content to lead the prescribed lifestyle of the upper middle-class 'lady'. Even if taken as a percentage of all female science graduates, some of whom could not be traced, but were not necessarily 'unemployed', those with recorded occupations still accounted for thirty nine per cent of the total. If their types of employment are broken down, we find that the single largest group of women was involved in teaching of some kind. Forty five of the sixty three carried out such work at some point in their careers accounting for seventy one per cent of the group, and forty two of these, or sixty seven per cent were engaged solely in teaching, according to the information which is available. This appears to re-affirm the conclusion of Alice Gordon's 1895 study that teaching was one of the few options available to educated women, and thus that university education did little to alter their career paths.

However, closer analysis shows that seventeen of these teachers, were working in higher education establishments. Ten were lecturers at such institutions as Royal Holloway College, U.C.L., the London School of Economics (L.S.E.) Battersea Polytechnic, Kings College London and Manchester University amongst others. A further three were demonstrators in similar institutions and another, Ethel N. Thomas DSc, became a reader in botany at U.C.L.

in 1915, before moving to the University of Leicester. Margaret J Benson DSc, achieved the high status of professor of botany at the University of London which she held from 1912-1922<sup>28</sup> after a career in lecturing which stemmed back to 1893. Benson was the second woman in the country to become a professor, after Edith Morley who became professor of English Language at Reading in 1908 and followed by Caroline Spurgeon in 1913.<sup>29</sup> She was the first female science professor in Britain and therefore a key figure in the development of women's education. Four other women held lecturing posts at some stage in their careers. Dorothy Marshall and Gertrude Talbot had varied careers as higher education lecturers, secondary school teachers, and lecturers in teacher training colleges. Barbara Tchaykovsky began her career as a demonstrator at Bedford College and then moved on to a medical career, and Marie Stopes worked for many years as a lecturer at Manchester University and U.C.L. before founding the first birth control clinic. In total, twenty one women were at some point involved in higher education teaching, accounting for thirty two per cent of the group in appendix B, and forty seven per cent of those who became teachers.

This is not to suggest that women did not enter more traditional posts as school teachers, many did. However the numbers who entered this profession were not greatly different from those who entered higher education. Seventeen women were recorded solely as school teachers, and a further five carried out a mixture of work in schoolteaching, teacher training colleges, lecturing and university administration. Thus, at most, thirty three per cent of the graduates in appendix B became school teachers, accounting for forty nine per cent of those who entered some kind of teaching as a career. Some of those who began their careers as school teachers did not remain in such posts. Winifred Hudd, for example, began work as a secondary school teacher, but then moved on to lecture at a teacher training college. Three other women followed careers exclusively as teacher trainers, and two became headmistresses of secondary schools. One, Amy Fildes became vice principal of the Hockerill Training

College. Thus, not all women remained in the more traditional areas of school teaching. In addition, all those women who taught in schools did so at secondary level. Not one was recorded as an elementary teacher, which shows that these women used their qualifications to move into more highly paid and competitive positions. Of the twenty two women who at some stage worked in secondary schools, thirteen were subject specialists or heads of department, whereas only nine were assistant mistresses. Thus women do not appear to have been confined to the junior posts in schools. An important outcome of the development of secondary teaching as a field of employment for highly educated women was that the quality of teaching in girl's schools, and the prestige attached to them grew. This important transformation enabled more young women to gain a high standard of school education, which increased their prospects of gaining later entry to university.<sup>30</sup> The first generation of female university graduates who became school teachers thus played a fundamentally important role in the development of women's education. It is noteworthy that forty seven per cent of female teachers became lecturers, and that the remaining fifty three per cent entered secondary schools and teacher training colleges. This implies that U.C.L.'s science graduates were able to broaden their horizons as a result of their education, entering fields of teaching which sometimes involved competition with men, were demanding and fulfilling and which contributed to the women's movement.

Women not only achieved high profile careers in teaching, nine carried out various types of research, six of a post-graduate, academic nature, and three of a more applied type. Of those who fell into the latter category, Winifred E Brenchley is a good example. She was head of the botanical department at the Rothamsted Experimental Station between 1907 and 1948, in addition to having a DSc, numerous fellowships, publications and an O.B.E.<sup>31</sup> Thus, not only did she reach a very high level in academia but she also used her skills to further a professional career in agricultural research. Dame Harriett Chick, also a Doctor

of Science, with a C.B.E., D.B.E. and a large number of fellowships and publications, who was to become the first female member of the scientific staff of the Lister Institute between 1905 and 1946,<sup>32</sup> began her career as a chemist for the Sanitary Commission in 1899, and then in 1900 took up research in bacteriology.<sup>33</sup> She was the founding member of the Nutrition Society and president from 1926 to 1959, and was secretary to food divisions of the Medical Research Council and the League of Nations between 1925 and 1945. Chick was awarded an honorary DSc from Manchester University as a result of her outstanding career. Ida Homfray, DSc, after moving from her post as research assistant at U.C.L. gained work on a chemical research project for the sewage commission in 1900.<sup>34</sup> These careers, some hinging on a traditionally 'unfeminine' concern with drains and sewers, although all of a high profile nature, have rarely been commented on as areas of employment which attracted educated women. In addition to her lecturing and museum work Ethel N Thomas was Vice President of the botany section of the British Association and honorary director of the Botanical Trust Research Laboratories. She also carried out pathological research for the war office and medical research committee as well as publishing prolifically. This provides a good example of a linkage between academia and practical research.<sup>35</sup>

Women also undertook work connected to the war effort. The 1914-1918 war, was potentially important to those who graduated between 1881 and 1913. There are an array of texts which outline women's increased role in society and especially employment during the war years.<sup>36</sup> Most stress how lifestyles changed for middle and upper-class women who had previously not worked, and how working-class women's activities altered, although this is frequently exaggerated (see chapter six below). Little attention has been paid to whether women who already had high academic qualifications and therefore good job prospects, benefited from the war. There were only four female graduates who took up war employment according to the student records. This does not mean that the war did not

stimulate areas of employment, not classed as 'war work' for women. The availability of teaching places, for example, increased as a result of male mobilisation, and recent research by Leneman has shown that there was a significant broadening of opportunity for female medics during the war.<sup>37</sup>

Of the four women who engaged in employment directly related to the war effort, two carried out voluntary work, an area which has often been described as a traditional choice for middle-class women, and its professionalism underestimated. The other two, in contrast were engaged in high profile committee work; Ethel Thomas, who has already been mentioned and Theodora Bosanquet who gained an entry in Who Was Who,<sup>38</sup> quite possibly because she descended from a high profile Huguenot family.<sup>39</sup> Bosanquet was assistant to the War Trade Intelligence Department and to the secretary for the Ministry of Food, as well as having an M.B.E. She is thus a good example that not all women were engaged in low-key supportive work, although such work was a credit to those women who kept the domestic economy from stagnating during the First World War. One of the two women involved in voluntary work, Mary Cunningham, gained a C.B.E. as the result of her efforts,<sup>40</sup> demonstrating that her involvement was on an equal footing with academic or administrative work.

Various conclusions can be drawn from the research at U.C.L. regarding women's activities after graduation. Firstly, although a record has been located for only forty one per cent of U.C.L.'s female science graduates, this is a highly significant figure, when it is borne in mind that the data was gleaned from student records which were not designed to record occupations, and directories which generally listed the more eminent figures of the day. It is probable that a number of the other women were engaged in occupations of a less prestigious, but still noteworthy nature. Secondly, women went into a wide range of

occupations after graduating. Ninety five per cent of those with a record were found to have a career, leaving a mere five per cent unaccounted for, although a number of U.C.L.'s other female science graduates were not traced, and therefore we do not know whether these became economically active. From the available data, it seems that many of these women were serious about pursuing careers, and can not be described as 'dilettante'. The largest single group were engaged in teaching, with quite similar proportions in higher and secondary education, forty seven and forty nine per cent respectively. This implies that their science degrees and post-graduate qualifications enabled them to expand their career opportunities, especially when it is considered that elementary teaching was the main outlet for the energies of intelligent women prior to the opening of higher education to them. Others took part in research, advisory committees, medical work, high level war work and a variety of pioneering activities. The suggestion is thus that female graduates took up a variety of activities, the majority going into 'professions' of some kind.

A definition of professionalism is not easy to establish, and it may be true that a number of women have been excluded from historical writings about professional workers, because their work has not been deemed high profile enough, or because a narrow range of traditionally male occupations have been used to define 'professional work', for example law, medicine, architecture and accountancy. Margaret Bateson, in a book written in 1895 based upon conversations with 'professional women' moved away from such a definition:

'I have... accounted as a profession any form of work which a woman is paid by the public, or entrusted by the public to do, and which she performs under that full sense of responsibility which we term the professional, in contradistinction to the amateurish spirit.'<sup>41</sup>

This is a useful description because it allows a whole range of female occupations such as nursing, laundry work, store keeping, librarianship, voluntary and social work, acting and



teaching amongst others, to be awarded public importance. Bateson's own list of 'female professions' numbered twenty six, notably excluding law and architecture. It also allowed for the inclusion of women who carried out all kinds of public occupations in the late nineteenth century, but were not remunerated for doing so. Such women were rarely captured by the censuses, because they were not regarded as 'economically active'. Nancy Blakestad has noted a tendency of both traditional and feminist critiques to denounce activities carried out by women, traditionally regarded as 'feminine', as unimportant or inequalitarian, rather than highlighting the achievements made by such women in choosing not to fit into male patterns of study or employment. Equality she argues, is not about women embracing the 'male system', but rather about finding areas in which they can excel and possibly even pioneer.<sup>42</sup> This is certainly a relevant argument, although what is notable about U.C.L's female science graduates, is how many of them gained high profile work in areas traditionally populated by men, such as lecturing, research, commission work and posts as hospital doctors. This does not necessarily mean that they saw equality only as competition in the 'male world' but rather that they sought work fitting to their qualifications and intelligence. Their success in lecturing is all the more impressive given the continuing struggle women faced in the academic profession. In 1914, Edith Morley stated:

'It is certain that a woman must be exceptionally qualified and far more distinguished than her male competitors to stand a chance of a professorial appointment'.<sup>43</sup>

This apparently was the case at the lower end of the profession as well. Dyhouse has ably demonstrated the many obstacles faced by women who wished to succeed as academics, and instances of male prejudice which they faced.<sup>44</sup> In general, women found it much more difficult than men to gain funding for research projects.<sup>45</sup> They also tended to be paid at a lower rate than their male colleagues, especially if they worked in women's colleges, where, in the 1890s, pay was often as low as £100 per annum. Women could earn more as

secondary teachers, and especially as headmistresses, which perhaps explains the apparently low proportion of university staff who were women nationwide. In addition, at Oxford and Cambridge, women did not qualify for recognised teaching posts until 1920 and 1926 respectively.<sup>46</sup> However, as Perrone has demonstrated, there was no centralised professional body which controlled the appointment of lecturers and no system of licensing. Thus it was an easier profession for women to enter than law, accountancy, medicine or engineering for example. In addition, unlike much public sector work, there was no official marriage bar in lecturing which was an added attraction for women who wished to combine work and marriage, although the evidence suggests that by 1904, as few as fifteen per cent of female lecturers in Britain were married.<sup>47</sup> This was probably a reflection of the fact that many universities imposed an unofficial marriage bar on their female staff.

The preference shown by U.C.L.'s female science graduates for the higher levels of teaching appears to have been driven by a desire to achieve worthwhile careers, whilst also avoiding the world of private business and industry in which women faced even lower pay, greater prejudice and often exclusion once married. Given the exceptionally high qualifications held by some of these women, it seems that their skills were underutilised by British industry, which ensured that industrial employment remained such an unattractive proposition for them. Indeed, U.C.L. did succeed in producing some women of outstandingly high profile, and it should not be assumed, without further research, that U.C.L. was atypical in this respect. Little research has been carried out which considers the later activities of female graduates in Britain. However, Wendy Alexander's study of women who graduated in medicine from the University of Glasgow between 1894 and 1914 is a useful comparison. She refutes the claim that women were less committed to practising medicine than men, indeed one wonders why they read a vocational subject such as medicine if this were the case. Eighty nine per cent of her female medical graduates gained positions after

graduating,<sup>48</sup> which suggests, without doubt, that they were career minded, as U.C.L.'s science graduates appear to have been. Most gained public health positions, and some set up as general practitioners. Hospital positions were hard to come by due to an extraordinary level of male prejudice, which perhaps explains why twenty per cent of Glasgow's graduates became medical missionaries, especially in India, where they gained high level hospital positions and much responsibility.<sup>49</sup> This was the case also for Annette Benson, MD of U.C.L. who is listed in appendix B. In 1895 she became senior medical officer at the Cama hospital in Bombay, and by 1900 had been promoted to the position of first physician.<sup>50</sup>

The findings from this study bring into question the commonly accepted view that educated women failed to enter high profile professional employment. There is currently a lack of research in this area, however, the results from U.C.L. suggest that some of the existing views on women, education and economic activity need to be re-evaluated and that highly educated women were one of a few sectors of the female population who were able to break out of their more traditional moulds. The following section considers the occupations of women who attended Regent Street and offers further insight into this question, because it deals with students who had gained a different, more practical, style of training, and were also of a different social status from those at U.C.L.

## **POLYTECHNIC MEMBERS**

Unlike U.C.L., no information was available on the careers embarked upon by women who had studied at the Y.W.C.I. after completing their courses. This was partly a result of poor recording methods, but also presumably because the type of education offered at the polytechnic was complementary to daytime employment, and most women who attended the Y.W.C.I were already employed. Thus, unlike the women of U.C.L. who studied on a full-

time basis, and then, after gaining their qualifications had the option of engaging in paid or voluntary work, women at the polytechnic did not necessarily enter 'new' employment after finishing their studies. However, the archives house records of the daytime occupations of women who were studying evening classes at the polytechnic. Whilst these do not show as clearly as U.C.L. a correlation between education gained and subsequent career opportunities, they give an indication of the types of work in which women took part, the extent to which they were employed at all, and whether or not their choice of course complemented their work, or whether it was designed to alter their employment opportunities.

This information was located in the candidate books from 1905 to 1913. Total membership figures for this period were 15,346 as shown in table 4.1, thus it was not feasible to attempt a complete analysis. The following study is therefore based upon a two per cent sample, or 300 polytechnic members. This is not within the realm of small sample statistics, and therefore, the results should be reasonably representative of the total population. Although male membership figures were almost three times greater than the female rate, the same sample of 150 was used for both sexes, thus weighted in favour of women. The reason for this was that women's experiences are the focal point of the study and it was important to consider a significant number of females. In addition, a direct comparison between men and women was not the sole objective. The sample was based on all nine years covered by the candidate books and on seventeen observations from each of six of the years, and sixteen from the remaining three. Years in which membership figures were at their lowest were chosen for this purpose.

The observations were selected by collecting total male and female membership figures for each year, and dividing by sixteen or seventeen. Where the result was, for example, twenty

six, then every twenty sixth candidate was recorded. The results of this exercise are shown in table 5.2 below. The findings have been placed in categories which have been created for ease of analysis.

**Table 5.2 OCCUPATIONS OF POLYTECHNIC MEMBERS, 1905-1913**

Occupation	No. of women	% by sex	No. of men	% by sex
<b>Non occupied</b>	<b>36</b>	<b>24.0</b>	<b>23</b>	<b>15.3</b>
Student	4	2.7	8	5.3
<b>White collar clerical</b>	<b>43</b>	<b>28.7</b>	<b>51</b>	<b>34.0</b>
Clerk/civil servant	25	16.7	47	31.3
Shorthand typist/secretary	12	8.0	0	-
Bookkeeper	4	2.7	2	1.4
Other	2	1.4	2	1.4
<b>Professional</b>	<b>9</b>	<b>6.0</b>	<b>10</b>	<b>6.7</b>
Teacher/governess	4	2.7	0	-
Chemist/pharmacist	2	1.4	5	3.4
Nurse	3	2.0	0	-
Architect	0	-	2	1.4
Other	0	-	3	1.9
<b>Retail</b>	<b>17</b>	<b>11.3</b>	<b>18</b>	<b>12.0</b>
Showroom/shop assistant	13	8.7	13	8.7
Draper/draper's assistant	4	2.7	5	3.4
<b>Manufacturing</b>	<b>35</b>	<b>23.3</b>	<b>31</b>	<b>20.7</b>
Engineer	0	-	9	6.0
Tailor/dressmaker	17	11.3	2	1.4
Milliner	10	6.7	0	-
Embroideress	3	2.0	0	-
Other*	5	3.4	20	13.3
<b>Unskilled/Miscellaneous</b>	<b>6</b>	<b>4.0</b>	<b>9</b>	<b>6.0</b>
<b>Total</b>	<b>150</b>	<b>100.0</b>	<b>150</b>	<b>100.0</b>

\* This category included many occupations such as electrician, bricklayer, shoemaker, carpenter, painter, woodcarver, vinegar maker and machinist. In most cases, only one person was engaged in each of these occupations which meant that it was impractical to list them all separately within the table.

**Source:** Candidate books, p106a and p107a, University of Westminster archives.

A few general comments can be made before a detailed analysis is offered. Firstly, the overwhelming majority of female students, 73.3 per cent of the total, were carrying out paid employment whilst they were enrolled at the polytechnic. Although the male non-occupied figure was lower than the female, 15.3 per cent as opposed to twenty four per cent, male members were twice as likely to be registered as full-time students, which supports the view that parents were more willing to pay for the education of sons than daughters. If the two categories are combined, it emerges that 26.7 per cent of women and 20.6 per cent of the

men in this sample did not take part in paid work. The female proportion was higher, but not significantly enough to suggest that the women of the Y.W.C.I. were less likely than men to need to work to earn a living. Table 5.2 shows that the most significant category of employment for both men and women was white collar clerical work, which was a field of employment increasingly aspired to by the upper echelons of the working classes because it was perceived to carry higher status than manual labour, and which included work such as bookkeeping, clerking and typing. Thus these students cannot easily be defined as 'working-class'. This category was less significant for women than it was for men, accounting for 28.7 per cent of their cohort compared to the male rate of thirty four per cent. The difference was made up in the manufacturing sector, where 23.3 per cent of the female total and 20.7 per cent of the male was to be found. So, whereas the male rate of participation was significantly higher in the white collar trades than in manufacturing, the female difference was much less distinct.

The higher rate of female involvement in the manufacturing sector is interesting, given their very low rates of participation in practical trade courses offered at the polytechnic, as discussed in chapter four. This was partly because most of the trade qualifications offered by the polytechnic led to careers in trades which were heavily male dominated. Table 5.2 shows that the key areas of manufacturing employment in which these women were engaged, were dressmaking, tailoring, millinery and embroidery and yet, as shown in table 4.2 the number of women who passed examinations in clothing manufacture, in the ten year period 1895-1904 was only fifty four. Although it is possible that more women sat the examination and that some failed, the number is still very small when it is considered that in the current small sample of 150 students thirty two women, or twenty one per cent of their total were registered as being occupied in the clothing trades, but that in an overall population of 4,005 female members only fifty four women, 1.3 per cent of their total passed examinations in

such subjects. Even if the number is doubled to allow for a fifty per cent failure rate, the percentage of women involved in clothing manufacture courses at the polytechnic was still only 2.7 per cent of total female membership. This suggests, that the vast majority of women who studied at the polytechnic and worked in the manufacturing sector were not doing so to increase their existing skills, but to gain new educational experiences, and to alter their career paths. This supports the earlier finding that women chose science, and practical design courses as a means of avoiding the 'special courses for young women' founded in 1888.

Establishing the number of polytechnic members who were apprentices, was another means of considering how women fared in the labour market compared to men, and why they might have sought an education at the polytechnic. This task was made easy by the existence of a separate column in the candidate books, in which a tick was placed if the individual was apprenticed. This enabled a quick and complete count of every candidate for all nine years 1905-1913, to be achieved. The results are shown in table 5.3 below.

**Table 5.3      POLYTECHNIC MEMBERS APPRENTICED WITHIN THEIR TRADES, 1905-1913.**

	<b>Total population</b>	<b>No. of apprentices</b>	<b>% by sex</b>
Men	11,341	238	2.1
Women	4,005	15	0.4

**Source:**      Candidate books, p106a and p107a, University of Westminster archives.

Significantly, the number and proportion of both male and female students who were apprenticed was extremely small, which emphasises that there was a bias towards white collar trades, where apprenticeship was less common. In addition, it indicates that in the decade or so before the First World War, the apprenticeship system was declining both on a local and national scale. Joan Lane's study of technical training in Coventry and the Midlands showed

that between 1905 and 1914 the number of male apprentices in Coventry was between fifty nine and eighty six per annum, and that between 1910 and 1914 male apprentices accounted for only 2.3 per cent of their age cohort. Between 1870 and 1879, 3,093 boys or 22.4 per cent of their age group had been apprenticed.<sup>51</sup> The figures of polytechnic members who were apprenticed between 1905 and 1913 were not dissimilar to those observed for Coventry in the later period. The following table provides a list of the types of apprenticeship held by male and female polytechnic members, and demonstrates that 'clerks work' accounted for only two of ninety apprenticeships. The same information also shows that, not only were men more frequently apprenticed than women, but that their apprenticeships covered a much wider range of trades.

**Table 5.4 TYPES OF APPRENTICESHIP, AND NUMBER OF MEN AND WOMEN PARTICIPATING IN EACH, 1905-1913**

Type of apprenticeship	No. of men	No. of women
Engineering	26	-
Drapery	22	2
Tailoring	5	-
Printing	5	-
Millinery	-	5
Dentistry	3	-
Plumbing	2	-
Chemistry	2	-
Showroom work	-	2
'Business'	-	2
Hairdressing	-	2
Clerk's work	1	1
Painting/decorating	1	-
Photography	1	-
Welding	1	-
Haberdashery	1	-
Corset making	-	1
Joinery	1	-
Surveying	1	-
Draughtsman's work	1	-
Building	1	-
Grocery	<u>1</u>	<u>-</u>
<b>Total</b>	<b>75*</b>	<b>15</b>

\* Only 75 of the male apprentices were listed by trade, the remaining 163 were simply described as "apprentice". All female apprentices were listed by trade.

**Source:** Candidate books, p106a and p107a, University of Westminster archives.



Given the greater participation of women in the manufacturing sector in general, their low propensity to gain apprenticeship is an indication that most were carrying out lower profile work within their trades than men, with little chance of promotion. For example, whilst the sample of occupations shown in table 5.2 indicated that four women and five men were working as drapers, or drapers' assistants, a very small difference, table 5.4 demonstrates that in total there were twenty two apprenticed male drapers and only two who were female. Thus, women found it far more difficult to secure training than their male contemporaries. Similarly, whilst there were seventeen female tailors and dressmakers compared to only two male tailors between 1905 and 1913, table 5.4 shows that no women held an apprenticeship in tailoring, whereas five men did in the same period. This, and the fact that such a small range of apprenticeships was available to women generally, explains why so few opted for practical trade courses, and offers another perspective as to why women showed desire to gain new and different qualifications at the polytechnic. Engineering was the greatest provider of apprenticeships for men accounting for twenty six of the male apprentices and yet was unavailable to women.

In addition to manufacturing and clerical work, women participated in retail work and the professions. This supports the suggestion that most of the polytechnic's students were drawn from the white-collar sector. In both areas, women made up similar numbers to men; nine professional women compared to ten men and seventeen shopworkers against eighteen males. Whitaker has suggested that shopwork was a growing form of employment for young women, and that it was an area in which they could gain apprenticeships more easily than in other trades.<sup>52</sup> This is borne out in table 5.4, where it is shown that two women were apprenticed as showroom workers whilst at the polytechnic, whereas no men had secured such training. However, the showroom apprenticeship system relied on the payment of a premium by the apprentice herself, which made the training expensive.<sup>53</sup> In addition, an

investigation by Margaret Bondfield of the National Union of Shop Assistants in 1898 showed that there were very few men in this trade who were over the age of thirty five.<sup>54</sup> This was because men did not regard the work as permanent because it was poorly paid and hours were long. Most shopworkers earned less than twelve shillings per week<sup>55</sup> and hours were notorious, with records of women working eighty five hours per week.<sup>56</sup> It has been argued that shop work was a contributory cause of illnesses such as neuralgia, anaemia, varicose veins, muscular weakness and even consumption,<sup>57</sup> which resulted from long hours of standing, often without breaks, and in some of the poorer quality shops, poor light and air supply. So, rather than being an attractive white-collar occupation, showroom work could be a stressful and tiring way of earning a living. In contrast, shopwork in many of the newer department stores did have attractions. When compared to factory work or general skivvying it was considered a 'respectable' way for a young woman to earn a living, the work regularly included board and lodging, though normally under close supervision, and the period of training was short in comparison to occupations such as nursing and teaching.<sup>58</sup> However, the prevalence of low wages outweighed the benefits of shopwork in the eyes of many young men, and it increasingly became regarded as a 'female occupation'.<sup>59</sup> It is difficult to demonstrate whether these women used their time at the polytechnic to gain alternative training and alter their employment prospects, although it is a possibility, given that no specific courses were offered in showroom work or sales. It seems probable that the male retail workers did intend a career change, on the basis that so few over the age of thirty five were still occupied as shopworkers in the labour market.

It is surprising that six per cent of women and 6.7 per cent of men were already involved in professional work before entering the college, and because the names of college members could not be traced to specific courses, it is difficult to assess their motivation. It is interesting that the numbers of male and female professionals were so similar, although there

were some differences in the types of work they carried out. Women were engaged mainly in teaching and nursing, and two were chemists. Five men were also chemists, but the remaining five were occupied in a wider range of professions such as architecture, accountancy, photography and estate agency. Again, this demonstrates that the options available to men were greater than for women. The difficulty women faced in gaining access to the professions suggests that they were unlikely to have studied at the polytechnic with the aim of altering their careers. Most probably aimed to better their qualifications to increase their chances of promotion. There were benefits to nurses for example in taking science options such as human biology, physiology and hygiene, and teachers could specialise in any number of theoretical or practical science options.

Finally, it can be observed from table 5.2, that more men at the polytechnic were engaged in 'unskilled' occupations than women. Although the number is small in total for both sexes, implying that polytechnic education did not appeal to many from this occupational sector, the higher number of men may be an indication that women in such positions simply could not afford college fees. A Board of Trade report from 1886 showed that whereas male average earnings in the manufacturing sector were twenty to twenty four shillings per week, average earnings for women were between ten and fourteen shillings. In addition 33,283 women fell within the lowest category of earnings, less than ten shillings a week, whilst only 1,092 men were in this position.<sup>60</sup> This suggests that women in the lowest paid sectors, of which domestic service is a good example, would have struggled to afford college fees, or to even consider college education an option.

Attempting to establish the role of the polytechnic in preparing women for further careers must be more speculative than for U.C.L. Even if the polytechnic had recorded careers of women after they left the Y.W.C.I., the results would not show so clearly as those of

U.C.L. a connection between employment and qualifications, because many polytechnic students would not have been engaging in their first occupation. However, the fact that so many female polytechnic students were already occupied, suggests that they were more likely to be looking to the polytechnic to offer them training in order to improve their work experiences, than was the case for women at U.C.L. It seems that, in spite of the polytechnic's pledge to offer technical and practical training, most women came from sectors outside manufacturing industry such as clerical, retail and even professional work. In addition those already working within manufacturing trades, seemed reluctant to take up courses which were relevant to their work. The college appears to have played a greater role in moving women away from the trades in which they traditionally participated than in providing special instruction on a large scale to complement their work. This was much less the case for men, where the proportions engaged in manufacturing employment, and in practical trade courses, were more similar. In conclusion, this trend amongst women to study options which were not those expected of them, was not merely a result of polytechnic policy, but a reflection of the wider social environment in which they were restricted to a narrow range of occupations within certain sectors, mainly the clothing trades, were rarely apprenticed, and on average were paid lower wages than men. If the polytechnic, through its policy of 'open access' to women in all subjects across the curriculum aided this movement, then it should not be criticised for doing so.

It has been demonstrated in the first half of this thesis, that women not only comprised significant portions of the student bodies of U.C.L. and the polytechnic before the First World War, but that they used their education and training to specific ends, namely to secure interesting and often demanding employment, or to qualify themselves for entry into alternative fields to those in which they already worked. Women, it seems, formed a potential and willing workforce, who succeeded in entering a wide range of occupations.

However, given the impressive qualifications and skills held by some of these women, their success in breaking into the 'male world' of industry was disappointing, and it appears that the numerous professional barriers, trade restrictions, marriage bars and low levels of pay deterred women from participating in such fields. This is particularly galling when it is borne in mind that a deficiency of knowledge regarding new scientific and technological methods was being highlighted as a major cause of Britain's poor economic performance, and yet it appears that the economy failed to utilise an available source of skill.

The following chapter considers how this environment had changed by 1918, the end of the First World War, and pays particular attention to the impact of economic restructuring in the 1920s, which created new fields of women's work. It also outlines the legacy of women's contribution to the economy during the war. Chapter seven briefly assesses the impact of a new era of female assertiveness and power, which resulted from the acquisition of the right to vote at the age of thirty, on opportunities for women, particularly in the field of education. These issues provide a context in which to discuss female progress in education and training at U.C.L. and the polytechnic during the 1920s, and to discover how their experiences compared to the pre-war years. The discussion begins with an assessment of the changing nature of the British economy between 1918 and 1930.

## NOTES TO CHAPTER FIVE

1. A M Gordon (1895), p. 955.
2. Ibid, pp. 958-9.
3. Ibid, p. 957.
4. M Vicinus (1985), p. 137 and pp. 158-62; M Vicinus (1982), pp. 603-4.
5. M Anderson (1984), p. 392.
6. D Copelman (1986), pp. 188-9.
7. E Davies (1866), pp. 108-19.
8. J Antler (1980), p. 412 and p. 425.
9. S Delamont (1978), pp. 135-7.
10. M Berg (1992), p. 318.
11. C Dyhouse (1995), p. 138.
12. M Rendel (1980), p. 146.
13. F Perrone (1993), p. 343.
14. C Dyhouse, op. cit, p. 138.
15. F Perrone, op. cit, p. 343.
16. M Rendel, op. cit, pp. 146-8.
17. F Perrone, op. cit, p. 344.
18. C Dyhouse, op. cit, pp. 142-3 and p. 146.
19. L Haber (1979), p. 5; see also A D Morrison-Low (19991), pp. 102-4 for details of female entrepreneurs who operated under their husband's names.
20. J Howarth and M Curthoys (1987), p. 224 and 227.
21. University of London calendar, 1905-6, pp. 267-71, U.C.L. Records Office.
22. L Leneman (1994), p. 176.
23. C Dyhouse (1989), p. 79; V Brittain (1978), p. 582.
24. Student record, SR31, 1913-14, U.C.L. Records Office; Directory of Women Teachers (1914), p. 172.
25. Student record, SR35, 1914-15, U.C.L. Records Office.

26. Student record, SR15, 1909-10, U.C.L. Records Office; Directory of Women Teachers (1927), p. 156.
27. Minutes of college committee, 8 Jan - 17 July 1907, Appendix A, U.C.L. Records Office.
28. Hutchinson's Woman's Who's Who (1934), p. 63; Directory of Women Teachers, (1914), p. 21.
29. F Perrone (1993), p. 347; C Dyhouse (1995), p. 140.
30. K Anderson (1963), p. 9.
31. Who Was Who (1961), Vol. 5 also student record, SR7, 1905-06, U.C.L. Records Office.
32. Who Was Who (1981), Vol.7; also college index card, U.C.L. Records Office.
33. Englishwoman's Yearbook (1899), p. 109; (1901), p. 129; (1904), p. 125.
34. Ibid (1901), p. 130.
35. Who Was Who (1951), Vol.4; also student record, SR35, 1914-15, U.C.L. Records Office.
36. See for example A Marwick (1977), pp. 51-82.
37. L Leneman (1994), pp. 161-9.
38. Who Was Who (1971), Vol.6; also student record, SR96, 1926-27, U.C.L. Records Office.
39. See Dictionary of National Biography (1886), pp. 412-4 and (1937), pp. 91-4.
40. Who Was Who (1941), Vol.3.
41. M Bateson (1895), p. viii.
42. N Blakestad (1992), paper presented to the History of Education Society conference, Liverpool, 4-6 December.
43. E Morely (1914), p. 16.
44. C Dyhouse (1995), pp. 154-60, shows that academic women who appear to have achieved great success, often had unhappy careers which were disrupted by a lack of acceptance by male work colleagues and poor promotion prospects. See in particular, her account of the experiences of Edith Morley. Margaret Murray's memoirs of her experiences as a student and lecturer of Egyptology at U.C.L. also make interesting reading, and demonstrate the prejudices of male anthropologists before the First World War. See M Murray (1963), pp. 97-8 and pp. 160-2. This account should be treated with some caution however, given that Harte and North claim it is 'wildly inaccurate' although 'highly entertaining'. See N Harte and J North (1978), p. 120.
45. C Dyhouse, op. cit, pp. 141-2.

46. F Perrone (1993), p. 347 and pp. 350-1.
47. Ibid, p. 340 and pp. 360-1.
48. W Alexander (1987), pp. 61-3.
49. Ibid, p. 57 and p. 60.
50. Englishwoman's Yearbook (1896) p. 154; (1901), p. 125.
51. J Lane (1979), p. 15 and appendix 1.
52. W B Whitaker (1973), pp. 56-7.
53. Ibid, pp. 56-7.
54. Ibid, p. 30.
55. M J Winstanley (1983), p. 70.
56. W B Whitaker, op.cit, p. 30.
57. Ibid, p.30; M J Winstanley, op.cit, p. 72.
58. M J Winstanley, op.cit, p. 69.
59. Ibid, p. 68.
60. P.R.O., LAB 41/4. Board of Trade Report (1886).



## THE ECONOMIC CLIMATE

The history of the British economy between 1918 and 1930 is well researched, and there is no need to enter into a prolonged debate on economic performance in this period. However, we are broadly concerned with the impact of economic change on female employment prospects, especially for those women who had skills and qualifications which might be applied to industrial work. Thus a brief outline of Britain's changing industrial structure and employment record during the 1920s will be provided as a context for later discussion.

The years which followed the declaration of peace in 1918 were prosperous for the British economy, with a release of savings and pent up demand creating a short lived, but significant consumer boom.<sup>1</sup> However, by 1920 the fortunes of the economy began to change, and Britain slipped into a slump which lasted for most of the 1920s. Performance improved a little up to 1929 only to be reversed by the Wall Street Crash in the USA which sparked off a worldwide 'Great Depression' in which Britain, along with numerous other nations suffered drastically.<sup>2</sup> Britain was less affected by the Wall Street Crash than other countries however, and was showing signs of recovery as early as 1931-2. Baines suggests, on this basis, that the slump which began in 1920-21 was much more damaging to the British economy than the Great Depression of 1929-31.<sup>3</sup> It is the impact of the 1920s slump with which this chapter is primarily concerned.

Causes of the slump are much debated, but it is generally accepted that economic performance in the 1920s hinged on the success of Britain's staple industries, which up to the First World War had accounted for a large proportion of industrial output and exports.

By the 1920s, these industries, such as coal mining, iron and steel, shipbuilding and cotton textiles were falling into depression, and were increasingly unable to match their pre-war output levels.<sup>4</sup> The explanations for the depression of Britain's large manufacturing base are numerous, and will only briefly be outlined here.

The First World War stimulated a level of demand for manufactured goods for the military machine which led to an increase in employment and output during the years of war but which the immediate years of peace simply did not require. Hence, a certain amount of contraction in manufacturing industry was a function of decreased military demand. In addition, new supply centres emerged during the War. India and Japan for example, cut off from former trading partners, began to produce their own cotton textiles,<sup>5</sup> and Scandinavia and the USA began developing large merchant fleets.<sup>6</sup> These developments had serious effects on British export industries which traditionally had supplied these countries with manufactured products. International trade was further distorted by the break up of the Austro-Hungarian Empire and the formation of 'successor states' such as Hungary and Poland which were highly nationalistic, and erected heavy tariff barriers which further discriminated against British and other European exports.<sup>7</sup> The formation of the Soviet Union after the Russian Revolution in 1917, and the decision to cease all trade with the capitalist west, was a further blow for Britain and the rest of Europe, which previously had relied on Russia as a market for its manufactured goods.

In addition, British and German inability to meet demand for their exports during war time and the destruction of the German economy after the war, created a gap which was increasingly filled by US exports. The result was that by the 1920s, the USA produced nearly half of the world's industrial output, whilst Britain suffered a significant fall in her share.<sup>8</sup> Similarly the USA also replaced Britain as the world's major creditor and provider

of international investment, adding to Britain's diminished international position.<sup>9</sup> Finally, British manufacturing industry was damaged by changes in the domestic market. The coal mining industry in particular was affected by the gradual preference for electricity as a source of power. Although electricity required coal for its own production process, it used less liberal quantities than steam power had done in previous years.<sup>10</sup>

The importance of government policy in shaping economic performance in the 1920s has also been debated, with significant criticism being waged against the Conservative government's decision to return to the gold standard at the pre-war parity of \$4.86 to the pound in 1925.<sup>11</sup> During the war, the pound had floated downwards which meant that for prices to be brought into line with the new exchange rate, a deflationary policy had to be embarked upon.<sup>12</sup> Such a policy was not compatible with full employment or healthy industrial performance. Interest rates remained high, and an estimated ten per cent overvaluation of the pound added to the problems which British export industries were already facing.

In contrast, others have interpreted the slump in micro economic terms, focusing on deficiencies within British business and suggesting that management inefficiency and labour disruption accounted for much of Britain's poor export performance.<sup>13</sup> This may have been true of some of Britain's more traditional manufacturing industries. The coal industry, for example, was swamped by a proliferation of small-scale units which, Hannah has argued, were individualistic, wasteful of resources and old fashioned. In addition the General Strike of 1926, followed by a miner's lockout of seven months, led to a loss of approximately 162 million working days<sup>14</sup> and 28,000 tons of coal for export.<sup>15</sup> However, other industries were developing throughout the 1920s which used new production methods and management techniques and in general suffered less from union militancy.<sup>16</sup> Also, after the miners were eventually forced to return to work with diminished wages and conditions, there followed a

lull in trade union activity, resulting in a period of labour quiescence during the remaining years of the 1920s and the 1930s, with a fall in trade union membership.

The 'causes' of the 1920s slump are numerous, and much debate has focused on the level of responsibility which should be assigned to institutions such as government, business and trade unions. A brief outline of the main explanations for Britain's poor economic performance has been provided, but it is not so important, for the purposes of this study, to ascertain the causes of the slump, as to consider the effects which it had on employment, education and training opportunities, especially for women.

The prevailing image of the 1920s is one of high unemployment, which did not fall below ten per cent on average,<sup>17</sup> although in some parts of the country unemployment was more severe than others. Areas which relied on the old staple industries for example suffered badly. Unemployment averaged 20.5 per cent in Scotland and 30.9 per cent in Wales, but was much lower at 9.3 per cent in the south east of England.<sup>18</sup> This highlighted a feature of the interwar economy, the growth of the 'depressed area'.<sup>19</sup> The image of the 1920s which has so far been presented is gloomy, and yet statistically growth in the interwar period was higher than before the First World War.<sup>20</sup> In addition, real incomes rose by approximately eighteen per cent between 1920 and 1930.<sup>21</sup> Such findings do not appear to support a case for industrial retardation or economic depression. However growth was not evenly distributed across all sectors. The most significant wage increases were in industries such as printing, utilities, transport, distribution and local government, whilst the much lower rises came in mining, quarrying, iron and steel manufacture, shipbuilding and textiles for example.

Alford shows that the 1920s and 1930s saw a structural shift in the nature of employment and earnings. He found that the share of gross national income taken by salaries increased by 2.6 per cent over the period, whilst that accounted for by wages decreased by 0.4 per cent. This indicates that there was a movement away from manual work, usually paid in wages, to service sector, commercial and professional employment, which was more likely to be salaried. This was also demonstrated by a number of geographical shifts which took place during the 1920s. Aldcroft has shown that gradually people began to move from city centres to suburbs and from the North of the country and Wales to the South East, South West, London and the Midlands. The former was stimulated by a fall in living costs, a rise in real earnings and improvements in urban transport, whilst the latter can be seen largely as a response to rising unemployment in the North, and an attempt to find employment in the more prosperous areas of the South.<sup>22</sup> Alford reminds us that the south also contained pockets of high unemployment, particularly in agriculture, whilst not all northern areas were depressed, coal mining areas in Yorkshire and the Midlands, for example, suffered less severely than those in South Wales and the North East, and the woollen industry in Lancashire made a slight recovery in the 1930s.<sup>23</sup> However, in general the growth sectors of the economy tended to be in the southern districts of England, which housed the majority of industries in which incomes were increasing.

These growth sectors were numerous, many were interlinked, and the suggestion has often been made that the industries involved were 'new' in the interwar period. Generally, the industries referred to are synthetic fibres, boosted by the development of rayon, motor vehicle manufacture, electrical engineering, chemicals (particularly dyestuffs, photographic processing and pharmaceuticals), printing, building, footwear, radio technology and canned foods.<sup>24</sup> There was also a large number of subsidiary industries such as aluminium, glass, leather and wood which were stimulated by the growth of the motor and construction

industries in particular. This group of industries has often been seen as a 'development block' in the interwar years, or as a range of industries which accounted for rapid economic growth. There is a debate over the extent to which some of these industries were genuinely 'new'. Footwear, building and printing for example were certainly not infant industries in the 1920s, but were stimulated by increased demand, and improved technology. The definition of this group of industries is perhaps best not described as 'new', but as a 'growth sector' which contributed to a rise in industrial output. Such industries still accounted for lower levels of output than the staple industries, although their share increased between 1924 and 1935,<sup>25</sup> but their rates of growth were far in excess and therefore these 'newer' industries played an important part in economic progress, and, as will be demonstrated shortly, in opening up a new field of employment for women.

Hannah has demonstrated that the business community in this sector was increasingly becoming disillusioned with free-market economics, and began to seek the benefits of economies of scale through amalgamation and elimination of redundant capacity.<sup>26</sup> Increasingly the 'newer' industries could be distinguished by their size and scale and their commitment towards scientific modes of production.<sup>27</sup> The formation of Imperial Chemical Industries (I.C.I) in 1926<sup>28</sup> is probably one of the best examples of the creation of a large amalgamated interwar firm, which along with others such as Courtaulds, a textile manufacturer, increasingly dominated the market for its own particular product. The emphasis placed on Research and Development (R&D) by such firms was also significant. I.C.I, for example, financed research laboratories in which expenditure had quadrupled by 1930 to reach one million pounds. By 1934 this figure was 1.4 million.<sup>29</sup>

This increased commitment to research and scientific enquiry, and an increase in government R&D investment through the Department of Scientific and Industrial Research, meant that

in theory a new emphasis was being placed on skill, expertise and possibly training, as methods of production became more technically based. The changing economic structure of the 1920s therefore, may have increased opportunities for skilled and educated workers, and had the potential to employ women who had scientific backgrounds, because many of these newer industries were lighter in nature than the traditional heavy manufacturing sectors, required an element of dexterity rather than brute force and therefore were seen as more 'appropriate' forms of female employment. As Jane Lewis states:

'During the interwar years, the growing importance of the 'new industries', particularly light engineering and rayon manufacture, meant that large numbers of women were employed in London and the South East, as well as in the traditional areas of textile manufacture in the North West, while in the rest of the North and Wales the proportion of women employed remained relatively low'.<sup>30</sup>

It is important to remember that whilst these newer industries provided increased employment opportunities for some, unemployment amongst men and women in the depressed areas of Britain was high. In addition, the increase in capital intensive methods of production in the growth industries meant that the sector was slow to absorb unemployed labour from other areas, and therefore did little to alleviate national unemployment problems. However, it has been suggested that women made greater gains in these growth industries than men and therefore that a number of new opportunities had opened for them,<sup>31</sup> especially if they lived in London or the South East. A more detailed discussion of women's participation in the labour force during the 1920s will be presented shortly, but firstly, some consideration will be given to their experiences during the First World War, which, in addition to the development of 'new industries' had a bearing on their opportunities in the labour market during the 1920s.

## WOMEN AND WORK DURING THE FIRST WORLD WAR

The immense contributions made by women to the wartime economy in Britain are well documented. Deborah Thom has outlined the widely accepted view that women's consciousness and opportunities changed during and after the Great War,<sup>32</sup> although she believes that the First World War was not the great landmark in women's opportunities that it is often claimed to have been. The initial years of war in fact created unemployment for many women, as their traditional areas of work were restricted as a result of decreased consumption. The textile trade, for example, contracted by forty three per cent during the first five months of war, and clothing manufacture, by twenty one per cent.<sup>33</sup> Many domestic servants and needleworkers were also made redundant, as wealthy families began to make cut backs. Women were particularly hard hit, because so many worked in 'luxury trades' such as millinery and lace making, which increasingly were regarded as unnecessary in the climate of war.<sup>34</sup> However, this situation was short lived as the increase in male conscription into the military meant that vital industries began running short of workers. It is well known that women rapidly began taking part in industrial work on government instructions in 1915, but it is often forgotten that 're-employment' of women actually began earlier than this in 1914, on an unofficial basis in areas such as clerical and shop work.<sup>35</sup>

By 1915, the Ministry of Munitions was formed, and the government policy of 'dilution' was embarked upon whereby women, the elderly and unskilled male workers were placed into areas of war work, particularly munitions production, in which they had not previously participated.<sup>36</sup> The accepted view is that this improved female opportunities, as women proved themselves capable of carrying out work which traditionally had been regarded as 'male'. However, Reid has shown that most munitions work in which women participated was new employment created by the needs of war, and that in reality only twenty three per



cent of female munitions workers were engaged in occupations which previously had been male dominated. In addition, the extent of dilution has been exaggerated. Although the engineering industries were heavily diluted, areas such as coal, iron and steel encountered virtually no female substitution. Women did work in the shipbuilding industry, but only at ten per cent of the rate at which they participated in engineering, and generally they carried out low skilled jobs such as floor sweeping, and storeroom work.<sup>37</sup> Thus the benefits of dilution to highly educated women are questionable. There is little evidence that women procured highly skilled or technical posts in manufacturing industry. As Reid states:

‘As far as women were concerned, both their increase in, and the nature of, their participation in the labour market has been considerably exaggerated by over-reliance on contemporary propaganda’.<sup>38</sup>

Women did not only work in factories during the war however, but also participated in transport, banking, government service, agriculture, and even entered the police force in 1915.<sup>39</sup> In addition, they were able to re-enter the formerly depressed textile industry in 1915, as the production of uniforms on a large scale created new employment opportunities.<sup>40</sup> Roughly one million women worked in munitions factories during the war, whilst in contrast, over two million were white collar workers. Thus white collar employment was a significant growth area for women, with the added feature that it lasted after the war.<sup>41</sup> This was an area of employment which was potentially attractive to educated women.

Braybon has also queried the view that many women workers during the First World War were new to the workforce having been brought in from their homes. Rather she claims that most had worked prior to the war, and had simply been transferred from slack to busy trades, or from domestic service. The notion of the upper-middle class woman doing her

duty for King and country she contends is largely a myth.<sup>42</sup> Thom shares her opinion, stressing that the rise in female participation in the work force between 1914 and 1916 was not accounted for by women who previously had not worked, but by the fact that July 1914 was a period of high female unemployment. This has created an impression of a growth in female participation by 1916, rather than a realisation that previously employed female workers were simply being reabsorbed, even if into new sectors.<sup>43</sup> The majority of women who were new to the work force in 1915 appear to have been working-class married women who are regarded to have comprised a very small section of the female labour force before the war because of trade restrictions which discriminated against them, although, because of the exclusion of some married women's work from the censuses before 1914, this view may not be accurate. During the war years, married women made up approximately forty per cent of all female workers in the country.<sup>44</sup> Although many historians believe that the contribution of middle class women who previously had not worked was negligible during the war, the roles of those who were educated and sought work prior to 1914 were very different. Little has been written on the subject of opportunities for such women during the First World War, but one would expect the development of sectors such as banking, finance, the professions and the civil service to have provided an opening for well educated women, even if at fairly low levels of seniority.

Medically trained women appear to have gained new opportunities during the war. By 1915, women were actively encouraged to seek hospital positions which previously had been exceptionally difficult to obtain, due to large numbers of men being called for service with the Royal Army Medical Corps (R.A.M.C.).<sup>45</sup> Not only did women gain new posts at home. A significant number went overseas to work in military hospitals, showing that they had the medical ability and the strength of character to work in often horrendous conditions. The majority of these women went out under the auspices of independent, all female medical

teams such as the Women's Imperial Service League, or worked in the medical hospitals of the allies - gaining high level awards from the French and Serbian governments for doing so. Sadly, these women were not recognised by the British War Office, and therefore their names do not appear in any official records. Women were allowed to work for the R.A.M.C., but only as assistants. They were never ranked as officers, even if they were far senior in years and experience to young male doctors, and were regarded as civilians.<sup>46</sup> There was still a good deal of prejudice and lack of recognition of the work done by women doctors at the front by the British authorities. However, both abroad and at home, often by forming independent medical teams, women succeeded, at least for the duration of the war, in carrying out jobs of high responsibility.

It would be wrong to suggest that the First World War did not alter women's lives and experiences, and indeed it was responsible for opening up new areas of work for women, both professional and manual, although it perhaps did not involve as many women who had previously been non-workers as has often been suggested. The extent to which women were able to retain their positions after the war is questionable however and will be considered in the following discussion. This section attempts to establish the extent and nature of female participation in the labour market during the 1920s, paying particular attention to the roles of highly educated women, given their contribution to the economy during the war, and the growth of a number of light scientific industries during the 1920s to which their skills were of potential benefit.

## **WOMEN AND WORK DURING THE 1920s**

Neal Ferguson has highlighted a factor common to the interwar years: that little has been written about women, and that there is a 'void' of knowledge relating to their participation

in this period.<sup>47</sup> This may explain, in part, why so many generalisations about women's economic position have prevailed. A useful starting point is to compare labour force participation rates by sex in the pre-war and post-war periods, to establish whether in quantitative terms, women's participation had changed by the 1920s. The following figures are derived from census returns, and therefore may exclude a number of women who took part in voluntary, casual or part-time labour.

**Table 6.1      PROPORTION OF MEN AND WOMEN EMPLOYED, BASED ON THE TOTAL POTENTIAL LABOUR FORCE FOR EACH GROUP, 1911-1931**

Year	% of males	% of females	Women as % of labour force
1911	83.8	32.5	29.7
1921	87.1	32.3	29.5
1931	90.5	34.2	29.7

**Source:** C Hakim, Occupational Segregation (1979), p. 25.

The figures in table 6.1 show that proportionately, women's participation in 1921 was lower than in 1911, even though the difference is very small. This cannot be explained by the slump of the 1920s and subsequent high levels of unemployment alone, because male participation over this period increased. By 1931 however, women's involvement had risen again, which may in part be attributable to the expansion of new and growth industries which were keen to employ female labour, and which in 1921 had not made a significant impression on the economy. It appears however, that women's efforts during the First World War had little effect initially on their ability to be involved in the workforce. The following discussion explores the extent to which all women were affected in this way, or whether some made significant gains.

The age structure of female workers changed a little between 1911 and 1921. Jane Lewis has shown that whilst the participation of women aged between twenty and thirty four remained static or increased, the rate amongst girls younger than fifteen and women aged over thirty five, especially aged between sixty five and seventy four, fell. This indicates that the average working age of women was narrowing, and may explain why there was some reduction in the proportion of working women. Reasons for this were the introduction of the 1918 education act, which stipulated that all children up to the age of fourteen must remain in full-time education,<sup>48</sup> and a growth of social security payments, particularly old age pensions, introduced in 1909, for those aged seventy and over, which meant that women did not have to work to such late ages. In short, the contraction in participation of the young and old, may be seen as a positive feature of a progressive economy, and perhaps we should not on this basis interpret the small decrease in total female participation immediately after the war as declining occupational opportunity for women.

Age, however, was not the only discriminating feature among women; their socio-economic backgrounds also affected the opportunities which they experienced after the war. The struggle faced by working-class women to retain their new found freedom when peace resumed is well documented. Ferguson, Braybon and Thom all recognise that as demobilisation began, the rhetoric of government and the unions quickly changed, and that they began advocating the reinstatement of women in the home, to make way for male labour and to increase the birth rate.<sup>49</sup> This was ironic, given that many working-class women who had worked in wartime industries had participated in the labour force prior to 1914, and had not been housewives exclusively. This is indicated by the fact that only fifty per cent of women who had worked on wartime production chose to withdraw from their jobs after the war, and many of these returned to alternative employment rather than the home.<sup>50</sup> Ferguson highlights the fact that women who attempted to retain their jobs after the

declaration of peace were no longer regarded as 'heroines', but as 'parasites' or 'limpets'<sup>51</sup>. As women were laid off, a problem arose. Although official rhetoric stated that women should 'return' to the home, most working-class women still sought employment. However their gradual exclusion from the industries in which they had worked during the war, and the contraction of their traditional areas of employment during the slump, in particular cotton manufacture, tailoring, dressmaking and millinery,<sup>52</sup> meant that there was a growing pool of unemployed female labour in this period. However, the government was reluctant to regard working-class women as 'unemployed' in the same light as male workers, and their inability to find work was frequently regarded as a temporary problem.<sup>53</sup> The tendency to regard women as 'dependents' rather than breadwinners still prevailed in this period, even though the huge numbers of male deaths and injuries during the war meant that this was inaccurate, as indeed it had been before the war.<sup>54</sup>

Women's struggle to claim unemployment benefit in this period is a good example of the lack of seriousness with which their plight was treated. Immediately after the war, an Unemployment Donation Scheme was set up, particularly to help demobilised soldiers. Only those who had contributed to the Health Insurance Scheme before 1918 qualified however, leaving many women unable to claim benefit.<sup>55</sup> By 1919, the cost of this scheme led the government to restrict payments to ex-servicemen.<sup>56</sup> This had repercussions not only on women, although it must have left many close to the breadline, but also on unemployed male workers, who had not served in the military during the war. However, in 1920 an Unemployed Insurance Act was introduced, which extended pre-war legislation to cover all industrial workers. This meant a potential improvement in conditions for women, although certain sectors were excluded from benefit, two of which were domestic and public service, both large areas of female employment.<sup>57</sup> In addition, married and young women did not qualify for any benefit at all.<sup>58</sup>

In spite of the problems of unemployment, and loss of wartime freedom experienced by women in the 1920s, especially in areas of the country which relied on traditional industries as a source of employment, the development of a new range of industries offered some hope to women. In some of these industries, for example, light metal trades, boot and shoe manufacture, printing and electrical appliances, women were willingly recruited, often in preference to men because they were perceived to be nimble and dexterous, and also cheaper to employ.<sup>59</sup> In addition, as Gordon (et al) show, the production processes used in newer industries were different to those of the staple industries, which because of their reliance on manual force, were heavily male dominated. Speaking of the newer industries they state:

‘Here, the assembly line was a prominent feature of the layout, and women were regarded as more suitable labour because they were supposed to resent less the drudgery. In addition, the absence of equal pay meant the newer industries found this source of supply attractive’.<sup>60</sup>

Thus, the overriding view was still that women were best suited to work which did not involve mental prowess, and as Glucksmann points out, arguments that women had nimble fingers and dexterity were convenient excuses, rather than real reasons for maintaining a sexual division of labour.<sup>61</sup> Sanderson suggests that women’s unemployment in the newer industrial sectors was less drastic than the male rate.<sup>62</sup> Lewis stresses that women were not displacing male labour in these industries, but were responding to new employment opportunities, which tended to absorb them in preference to men for one or more of the reasons discussed above.<sup>63</sup> However, the poorly paid unskilled or semi-skilled machine minding which many of these women carried out was work which men were rarely willing to do, and therefore these types of employment became regarded as ‘female work’.<sup>64</sup> The question of whether working-class women were motivated to acquire any form of education or training in order to improve their work performance or knowledge is therefore debatable.

Nevertheless, the growth sectors of the economy did provide a significant level of employment for women, and also enlarged their potential spheres of influence.

Although cotton manufacture and the clothing trades were depressed by 1930, they were still the two largest areas of female employment, accounting for 244,500 and 263,400 women workers respectively.<sup>65</sup> Thus the expansion of female employment in the growth sectors should be qualified. In addition, Mike Savage has suggested that the proportional significance of women in the 'new industries' of the interwar years was not very great. Women comprised only twenty eight per cent of the engineering operative workforce in Britain and twelve per cent of the vehicle construction workforce, and their only really significant level of participation was forty one per cent in the various food production industries. Therefore, he contends, men still comprised the bulk of the workforce, even in these newer industries.<sup>66</sup> However, women should not only be considered in the light of male rates of employment. Even if their absolute levels of employment were lower than those of men, their rates of growth were especially high in the preserved food industry, but also in electrical engineering, motor vehicle manufacture and hosiery<sup>67</sup>. All of these, with the exception of hosiery, can be classed as 'new industries' of the interwar period. This supports the contention that the new industrial sectors were dynamic, with high rates of growth, and therefore relevant to interwar expansion.

In addition, older established trades were able to offer good female employment opportunities because of increased demand or changes in methods of production. Furniture and upholstery were stimulated by the expansion of the building and motor vehicle manufacture industries, whilst the biscuit and confectionary trades expanded as a result of the resumption of peace, and increased consumer choice and disposable incomes. The tobacco industry grew, largely because of the move from pipe tobacco to cigarette manufacture, and the fact that smoking



was becoming more fashionable, especially amongst women, whilst the various printing and stationery trades gradually offered increased employment to women as they improved their mechanisation processes, which reduced the level of skilled craft labour needed. Coleman's account of Courtaulds' development, suggests that during the 1920s, rayon manufacture was an area of employment which also increased significantly for women.<sup>68</sup> As Courtaulds held the majority of the market share in this area of production, this finding can be considered reliable. Although many of these new and growth sectors did not provide the same quantity of jobs as the older female trades, they did offer a vast plethora or 'range' of jobs in which women could participate, and were responsible for a considerable amount of growth in female employment.

Another group of women benefited more obviously in the aftermath of war, lower middle-class women. The types of work carried out by such women tended to be different from those engaged in by working-class women, although there was a degree of overlap. The greatest increases were in retailing and shop work, where by 1931, 544,121 women were employed, 149,590 as owners and managers, and 394,531 as shop assistants.<sup>69</sup> It is difficult to say with precision how great the increases in this area of work were, because the census of 1881 did not enumerate part-time and family shop workers, and thus excluded many women, however, there is a general agreement that shop work increased as an area of female employment in the 1920s.<sup>70</sup> Clerical work was another growth area, and one of the few types of employment which continued to rise after the war.<sup>71</sup> Bryant explains this as part of a move towards a 'second' or 'consumer' revolution which paved the way for a growth of services such as typewriting and clerk's work.<sup>72</sup> Table 6.2 below shows that this increase was quite phenomenal.

**Table 6.2 FEMALE CLERICAL WORKERS, 1911-1931**

	England and Wales	Scotland
1911	149,215	33,567
1931	1,184,778	173,366

**Source:** E Roberts, Women's Work, 1840-1940 (1988), p. 38.

The increase of over one million workers in this sector in England and Wales was particularly astounding, and has led many to suggest that lower middle-class women made the greatest gains as a result of the war,<sup>73</sup> although Roberts recognises that working-class girls were also keen to enter white blouse employment, and that many succeeded.<sup>74</sup> Teaching along with local and central government work also continued to be growth areas for lower middle and middle-class women. Bryant believes however that progress was slow for middle-class, educated women who should, in theory have participated to a greater extent than in the pre-war years due to broadening educational and professional opportunity in the 1920s.<sup>75</sup> Although opportunities for such women were perhaps slow to develop, Ferguson stresses that they made greater gains than many other groups of women.<sup>76</sup> In 1919, the Sex Disqualification (Removal) Act was passed, which stipulated that no person who attempted to enter a profession should be discriminated against because of their sex or their marital status, although female civil servants could still be restricted from working once married.<sup>77</sup> Thus educated women who wished to work gained official sanction. However the Act has received criticism for being ineffectual, and as Vera Brittain stated, there was fear amongst women that:

‘The government which had passed the Sex Disqualification (Removal) Act on a surge of sentimental post-war gratitude did not really intend to keep faith with the women who were no longer supposed to be handicapped by sex or marriage.’<sup>78</sup>

Carol Dyhouse demonstrates that the policy was not adhered to at local level. Nottingham L.E.A. for example, introduced a marriage bar on female teachers in 1921, followed in 1922

by Lincoln, Leeds, Sheffield, Smethwick, Sunderland, Barnsley, and London in 1923. By 1926 around seventy five per cent of all L.E.A's operated some kind of marriage bar. Local authorities often managed to dismiss female teachers on marriage by careful interpretation of the terms of the 1919 Act. Rhondda district council in 1923 backed the sacking of married women on the grounds that the act only 'provided' that marriage did not disqualify women from employment. This did not mean that married women were necessarily entitled to be employed.<sup>79</sup> In the early 1920s, public health authorities such as Glasgow and St Pancras, in addition to local education authorities, dismissed female doctors, nurses and charwomen who were married.<sup>80</sup>

The explanations for such dismissals are both economic and ideological. Growing competition for jobs in the 1920s encouraged L.E.As and health authorities to ease some of the pressure by targeting married females, but foremost was the opinion that women could not carry out the dual occupation of wife and schoolmistress successfully. Dyhouse shows that this view was often held by members of local education committees.<sup>81</sup> Given that prior to 1914, twenty five per cent of all female teachers had been married<sup>82</sup>, the operation of marriage bars by seventy five per cent of L.E.As by 1926 indicates a regressive trend in female opportunity. However, Dyhouse also notes that a joint force of the National Union of Women Teachers, the Fabian Women's Group and the Open Door Council managed to abolish the bar in London by 1935.<sup>83</sup> This demonstrates that although there were new barriers to female employment in the interwar years, women themselves sought to overcome such obstacles, and according to Copelman, married women gained much support from male members of the teaching profession. On a wider national basis however, married women from all socio-economic backgrounds were 'encouraged' to regard their roles as wives and mothers as paramount, and to 'return' to their homes after 1918. This was stressed in

government propaganda, and particularly by the Ministry of Labour during the 1920s.<sup>84</sup> Once again, married women were discouraged from participating in the labour market.

Medical women, whether married or not, saw a reduction in opportunity once peace resumed in 1918. Although a number of the pioneering women who had worked at the front during the war, or had held important posts in domestic hospitals, managed to retain hospital positions, none of those who had worked as surgeons during the war retained their posts, except for a few who specialised in gynaecology. As male medics returned from the front, women were also discouraged from studying medicine. Most London teaching hospitals closed their doors to women, with the Royal Free remaining the only hospital which offered women a clinical training during the 1920s.<sup>85</sup> There was growth in opportunity for women doctors in local government and school health services, but these women were nearly always employed as assistants.<sup>86</sup> These kind of posts were offered to women because they were poorly paid compared to hospital posts, which were increasingly restricted to men in the 1920s.<sup>87</sup> Although women were officially granted access to professional employment, their chances of gaining equal pay or promotion were still limited.<sup>88</sup> As Ferguson states:

‘Professional women benefited from the Sex Disqualification Act that insisted they not be discriminated against, but the act was only the leading edge of a wedge that was not hammered forcefully... Once admitted, women found themselves confronted at every step with a host of other hurdles’.<sup>89</sup>

Meta Zimmeck has shown that in the civil service policy hardened after 1920, and for the first time the marriage bar was extended to the higher ranks of the service. This policy was followed because educated women were:

‘demonstrating their ambition to open up the upper echelons of the civil service proper to women. In so doing, they threatened to lower the status and undermine the morale of the small ‘elite’.<sup>90</sup>

In addition to a bar on married women, the first division of the service excluded all women initially. A small handful were allowed entry to administrative posts, but only in order to supervise other women. Their positions were not deemed comparable with men's, thus there was no joint seniority list and no direct competition between women and men.<sup>91</sup> Zimneck outlines a range of methods used by the Treasury to prevent women securing high clerical posts. Ex-servicemen were taken on in preference to women, even if they were unqualified and had not worked for the service prior to the war. In 1922 examinations were introduced, giving women the possibility of entering the higher grades. Men did not have to sit such examinations in order to progress however, and of 500 women who took the examinations only three gained senior executive positions and sixteen, higher clerical posts. The outcome of this seemingly regressive policy was that the proportion of women civil servants fell from forty two per cent in 1919 to twenty five per cent by 1928.<sup>92</sup> Certainly then, in public sector employment, it seems that women were treated more harshly during the 1920s than they had been prior to the war, and that the provisions of the 1919 Act had little practical effect.

Sanderson has highlighted some growth of opportunity for university educated women however. The number of female factory welfare workers increased from around sixty or seventy before the First World War for example, to 1,000 by 1918. By 1939, their numerical presence was the same as in 1918, but around 800 men had also moved into the profession, largely because it gradually became more scientific than philanthropic, and thus no longer regarded as work which was suitable only for women.<sup>93</sup> Educated women were also gaining a foothold in engineering, although figures were small compared to those in industrial welfare. The formation of the Women's Engineering Society in 1918, and a number of pioneering female engineers such as Caroline Haslett and Lady Parsons, paved the way for the growth of a profession.<sup>94</sup> Mechanical and civil engineering were still

unpopular amongst women, and also very difficult to enter, but the new field of electrical engineering provided an opportunity for women to use their skills in areas which were not so heavily manual. In fact a Women's Electrical Association was set up in the 1920s to promote the study of electrical application in university curricula. This gained backing from the C.E.B and from Ferranti, which demonstrates that women's aspirations were beginning to be taken seriously.<sup>95</sup> This should not be taken to mean that women entered the engineering profession with ease. They were, for example, forbidden by law from working night-shifts in engineering works before 1934, which made them unable to fit in with many firms' working patterns, and therefore inflexible. In addition, if apprenticed, women were obliged to work with a female supervisor, which not all companies were willing to provide.<sup>96</sup> However, women had more success in entering the relatively new fields of marketing and advertising, because some employers were keen to employ women to market goods which in many cases would be consumed by other females.<sup>97</sup> Women also participated to a greater extent in scientific research in the 1920s than previously, especially in light areas such as textiles and pharmaceuticals. The development of domestic science as a subject worthy of higher study also created a larger range of research fields such as dietetics, food processing and catering. Not all firms regarded women as suitable employees, and firms such as Crosse and Blackwell, Fry's, Virol, Heinz, Courtaulds and many others refused to employ female researchers or advertisers during the 1920s.<sup>98</sup>

Although Sanderson spends much time highlighting a growth of opportunity for educated women in the interwar years, he is keen to stress that women still comprised a minority in such areas. In a study of sixteen university colleges, he shows that only seven per cent of women entered industrial careers after graduating. However, he bases this finding on a 'median average'. If the mean average is calculated, the figure is in fact 11.2 per cent, so it appears that Sanderson has chosen to underestimate his figures in this case. In addition,

he presents no data for six of the colleges included in the average for the 1920s, which suggests that his findings are based on a certain amount of generalisation. Finally, many of his institutions were neither science nor technology based, for example Royal Holloway College, Durham, and St Andrews, and one might not expect large numbers of their graduates to have entered industrial careers. Indeed it would be interesting to see what percentage of male graduates from similar institutions went into industry. At Imperial College, one of the clearest examples of a scientific and technological establishment, 35.5 per cent of female graduates entered industry after graduation.<sup>99</sup>

Numerous examples of restriction and opportunity can be cited for the 1920s, and it is difficult to establish definitively whether women's position in the economy improved during this decade because there is still a lack of specific research. Although the proportion of women in the workforce changed little, and if anything fell slightly after the war, important shifts were taking place amongst different groups of female workers. The most notable opportunities for those women who did not suffer unemployment, and who were not diverted back to the home or into domestic service were in new industrial sectors such as light engineering, rayon manufacture and food production and in the lower levels of clerical work. Although many of the 'newer' industries were based on more scientific modes of production than the older staple industries, most women who were employed in these sectors did not need to be highly trained to carry out their work, with most being machine minders or production line workers. A study of the types of courses taken by women who attended the polytechnic at Regent Street during the 1920s, and an account of the occupations in which these women were engaged will hopefully give some indication of the reliability of this assessment.

The extent to which highly educated women gained from the development of new industrial sectors is still uncertain, but in theory opportunities should have been promising given that such industries tended not to be so physically demanding as the traditional staple industries, used more updated technology, and required precision, dexterity and scientific knowledge in the higher ranks. Similarly the growth of white collar work, may have encouraged women to develop their educational qualifications, although highly educated women were increasingly discriminated against in the Civil Service and the teaching profession. Chapter ten, which considers the post graduate activities of women educated at U.C.L. and the polytechnic aims to discover the extent to which these new developments in the economy affected their career choices. Firstly, a brief outline of the education and training policies of the 1920s, and women's progress in this field is provided as a background to understanding their rates of participation at U.C.L. and the polytechnic.



## NOTES TO CHAPTER SIX

1. D Baines (1994), p. 172.
2. B W E Alford (1975), p. 15.
3. D Baines op.cit, p. 172.
4. B W E Alford (1981), p. 309; B R Mitchell and P Deane (1962), p. 116.
5. B W E Alford (1981), p. 309; D Baines, op.cit, pp. 169-70; M W Kirby (1981), p. 26.
6. D Baines op.cit, p. 174.
7. Ibid, pp. 174-5.
8. Ibid, p. 170; M W Kirby, op.cit, p. 26.
9. D Baines op.cit, pp. 170-1; P Fearon (1979), p. 16.
10. D Baines op.cit, pp. 174-5.
11. Ibid, p. 177; B W E Alford (1981), p. 310.
12. D Baines op.cit, pp. 177-8; P Fearon, op.cit, p. 23.
13. B W E Alford (1981), p. 310.
14. L Hannah (1976), p. 37; E Wigham and N Branson (1976), p. 66.
15. S Pollard (1992), p. 142.
16. For a full discussion of 'new industries' in the interwar years see pp. 169-71 below.
17. B W E Alford (1975), p. 29.
18. Ibid, p. 75.
19. D Baines op.cit, p. 175.
20. M W Kirby op.cit, p. 29 suggests that G.D.P. grew by 2.3 per cent per annum between 1924 and 1929. D Baines op.cit, p. 179 gives a more conservative figure of 1.3 per cent. However, both exceed the figure presented by R C O Matthews (et al) (1982), p. 22 for the period 1873-1913 of 0.9 per cent.
21. B W E Alford (1975), p. 76.
22. D H Aldcroft (1983), pp. 25-7.
23. B W E Alford (1975), p. 46.
24. M W Kirby op.cit, p. 30; B W E Alford (1981), p. 315.

25. N K Buxton (1975), p. 219. In 1924 the 'new' industries accounted for 14.1 per cent of net industrial output and the staple sector for 37 per cent. By 1935 the share held by the new industries had risen to 21 per cent, whilst that of the staple sector had declined to 27.8 per cent.
26. L Hannah (1983), pp. 29-32.
27. Ibid, p. 36.
28. Ibid, p. 28.
29. Ibid, p. 113.
30. J Lewis (1984), p. 149.
31. G Braybon (1981), p. 217.
32. D Thom (1988), p. 297.
33. Ibid, p. 301.
34. G Braybon op.cit, pp. 44-5.
35. D Thom, op.cit, p. 302.
36. A Marwick (1977), p. 51.
37. A Reid (1988), pp. 19-20.
38. Ibid, p. 17.
39. G Braybon op.cit, p. 46; A Marwick, op.cit, pp. 73-7 and pp. 81-2; J Lawrence (1994), p. 158.
40. D Thom op.cit, p. 306.
41. A Reid op.cit, p. 18.
42. G Braybon op.cit, p. 47.
43. D Thom op.cit, p. 304. Thom uses 1916 as a benchmark date, because this was the year in which the absorption of women into the workforce was at its height.
44. G Braybon op.cit, p. 49.
45. L Leneman (1994), p. 161.
46. Ibid, pp. 162-72.
47. N A Ferguson (1975), p. 55.
48. J S Maclure (1979), p. 171.
49. N A Ferguson op.cit, p. 57; G Braybon op.cit, pp. 174-7; D Thom, op.cit, p. 313.
50. G Braybon op.cit, p. 179.

51. N A Ferguson op.cit, p. 57.
52. Third Census of Production in the UK (1924) and Fourth Census of Production in the UK (1930).
53. G Braybon op.cit, p. 179.
54. Ibid, p. 175.
55. Ibid, p. 179.
56. J Lawrence op.cit, p. 162.
57. Ibid, p. 163.
58. G Braybon op.cit, p. 181.
59. G Braybon op.cit, p. 217.
60. P Gordon, R Aldrich and D Dean (1991), p. 130.
61. M Glucksmann op.cit, pp. 216-21.
62. M Sanderson (1972), p. 333.
63. J Lewis (1984), p.158; M Sanderson op.cit, p.333.
64. G Braybon op.cit, pp. 217-8.
65. See Third Census of Production in the UK (1924) and Fourth Census of Production in the UK (1930).
66. M Savage (1988), p. 120.
67. According to the Third and Fourth Censuses of Production in the UK, women's participation in the food preserving industry rose from 7,200 in 1907 to 27, 100 by 1930, in electrical engineering from 16,800 to 60,500, in vehicle manufacture from 6,900 to 37,500 and in hosiery from 38,200 to 82,400.
68. D C Coleman (1969), p. 430.
69. E Roberts op.cit, p. 37.
70. Ibid.
71. Ibid, p. 38; A Reid op.cit, p. 18.
72. M Bryant (1979), p. 111.
73. See for example, G Braybon op.cit, p. 216.
74. E Roberts op.cit, p. 38.
75. M Bryant op.cit, pp. 120-1; N A Ferguson op.cit, p. 56.
76. N A Ferguson op.cit, p. 59.

77. Public General Acts (1919), 9 and 10 George V, Chap. 71.
78. V Brittain (1978), p. 581
79. H L Smith (1990), p. 53.
80. C Dyhouse (1989), p. 79; V Brittain, op.cit, p. 582.
81. C Dyhouse (1989), p. 79.
82. P Gordon (et al) op.cit, p. 131.
83. C Dyhouse op.cit, pp. 79-80.
84. See Ministry of Labour statement cited in D Thom, op.cit, p. 314.
85. L Leneman op.cit, p. 176.
86. M Bryant op.cit, p. 111.
87. N A Ferguson op.cit, pp. 60-1.
88. Ibid, p. 59, states that during the interwar years, female pay remained at around two thirds of the male rate.
89. Ibid, p. 68.
90. M Zimmeck (1984), p. 905.
91. Ibid, pp. 907-9; H Martindale (1938), p. 97 and p. 99.
92. M Zimmeck op.cit, pp. 911-2 and p. 915.
93. M Sanderson op.cit, p. 320.
94. Ibid, p. 321.
95. Ibid, pp. 322-3.
96. Ibid, pp. 336-7.
97. Ibid, pp. 323-5.
98. Ibid, pp. 326-7.
99. Ibid, see Sanderson's table, and footnotes in particular on pp. 330-1.

**EDUCATIONAL CHANGE DURING THE 1920s**

The economic restructuring of the 1920s, outlined in the previous chapter, created an environment which in theory encouraged the development of education and training, because of a growth of scientific and technical modes of production, which increasingly created a need for trained personnel.<sup>1</sup> However, the prevailing image is that education and training stagnated during the interwar years. Although there is some empirical evidence to support this assertion, the image has resulted primarily from a lack of research, and therefore a dearth of information for the interwar period. The following extract from West's appraisal of twentieth century education, is a good example of the way in which the 1920s and 1930s are frequently dismissed in historiography:

‘Such decisive foundations having been laid at the beginning of the century, there is no need to elaborate on the developments of the next thirty or so years within the main structure. In any event, since many of the ad hoc provisions of this interim period were consolidated in the epoch making 1944 Act, it will be more convenient to review next this crowning piece of legislation’.<sup>2</sup>

In spite of this apparent lack of interest in the interwar period, some historians have discussed educational change in the 1920s and 1930s, and of these, many claim that education and training stagnated. Barnett, for example, is highly critical of British provision, stating that there was widespread opposition from industry to the idea of day continuation schooling and that the universities were conservative and apathetic to the needs of industry.<sup>3</sup> In contrast Gordon, Aldrich and Dean refer to the interwar years as an era of ‘missed opportunities’, recognising that some advance was made, but that it occurred at a slower rate than might have been hoped, especially in the provision of state schooling.<sup>4</sup> Sanderson also adopts this position, recognising in particular that after the advances made in the late-

nineteenth and early-twentieth centuries, particularly in the field of technical training, growth in the interwar period was steady, but disappointing.<sup>5</sup> Although the interpretations of authors vary, the overwhelming impression is one of poor educational performance. However, the field of education is diverse and with careful research, areas of progress and development can be highlighted. This chapter focuses primarily on scientific, technical and vocational education, especially for adults, although this is not to discount the importance of work which has focused on developments in schooling.

The Fisher Education Act, passed in 1918 has been portrayed by many as a disappointment for example, because although it increased the number of state scholarships to secondary schools,<sup>6</sup> and stipulated that all children must stay at school until the age of fourteen,<sup>7</sup> by the 1930s, a consultative committee on secondary education discovered that eighty three per cent of the total school population aged between eleven and fourteen were still being educated in elementary schools, because their parents simply could not afford a secondary education.<sup>8</sup> In addition, the pledge to compel children aged between fourteen and sixteen who had left school, to attend day continuation classes for 320 hours per year was abandoned in 1922 due to opposition from Conservatives, parents and employers, who regarded the scheme as expensive and unnecessary, and the unwillingness of L.E.As to offer resources.<sup>9</sup> Thus the Act has often been portrayed as a failure, although it went much further than any previous legislation in attempting to increase the proportion of children who received a secondary education.

As chapter six demonstrated, the reasons for the apparent failure of this policy and indeed of other educational schemes were numerous. Britain in the 1920s was in a state of turmoil, damaged by the effects of war, the restructuring of traditional markets and high levels of unemployment which were proving to be costly. The large increase in government debt

during and after the First World War, also gave little room for manouvre. In addition Treasury grants to education had risen from nineteen million pounds in 1918-19 to thirty two million by 1919-20 and fifty million by 1922-3.<sup>10</sup> The government's response to this growing financial crisis was to impose the Geddes Axe of 1922-23. This proposed a series of spending cuts, which were to amount, in the case of education, to a reduction of eighteen million pounds from the budget. Gordon (et al) propose on this basis, that the government regarded education as an 'unwarranted consumption of national wealth', rather than as an investment for the future.<sup>11</sup> However, fierce opposition from labour politicians, trade unions and some liberals led to a lesser reduction in the budget of six and a half million.<sup>12</sup> Nevertheless, the quality of education and training which the state was able to offer, diminished as a result of this Act,<sup>13</sup> although some benefits arose from the troubles of the 1920s. For example, large numbers of highly qualified science and arts graduates were attracted into the teaching profession, because of the difficulty of finding alternative employment during the slump.<sup>14</sup> Thus, although this did not indicate a favourable climate of employment for graduates, it did mean that whilst the resources of schools were being squeezed, their staff were increasingly better qualified than previously.

The impact of the 1920s slump was not so damaging to all areas of education, and it appears that for adults the climate was more positive. The history of the polytechnic movement during the 1920s is rather patchy, with the majority of research providing accounts of individual institutions rather than the growth of polytechnic education per se. However, these highlight that significant progress was being made. For example, the London County Council (L.C.C.) increased its grant to Woolwich Polytechnic from £11,265 in 1911-12 to £18,850 by 1919-20, and by the 1930s, the figure had risen to £50,000.<sup>15</sup> In addition, during the 1920s the L.C.C. aided ten polytechnics and nineteen technical institutes financially and maintained nine technical institutes, five schools of art and three trade schools

for girls in London.<sup>16</sup> Although central government was not heavily involved in the finance and regulation of polytechnics, the L.C.C. played a significant role, after the war, in approving staff appointments, salary scales and courses of study.<sup>17</sup> The number of students enrolled at Woolwich increased significantly from 1,100 in the early 1900s to 4,000 by the 1930s.<sup>18</sup> This trend was observed in other institutions. Brighton School of Art for example had provided for 487 students in 1914, but by 1919 this figure had doubled.<sup>19</sup> At the Central Commercial Evening School in Manchester, 1,500 students were enrolled in 1900, and by 1929-30, this figure had risen to 2,305.<sup>20</sup> All of these factors suggest that further education was expanding in the interwar years, and strengthen the argument that education was not stagnating. Halsey outlines that further education, in particular polytechnic provision was one of the most significant educational growth areas in Britain between 1910 and 1967, and that increasingly women came to dominate in this field,<sup>21</sup> although Marian Bartlett has argued that a problem with voluntary evening tuition as a method of training, was that it tended to have high drop-out rates.<sup>22</sup>

University education has been accused of retaining its pre-war, elitist character and failing to expand, largely because the scholarship system, which permitted intelligent pupils to attend secondary schools, was perceived to be biased in favour of 'higher' social classes, thus affecting the later intake of the universities and ensuring that they remained the preserve of the elites.<sup>23</sup> However, other sources of funding were made available during the interwar period which aided the passage to university for some. Aside from the provision of state scholarships, government funding for universities in the form of grants increased after the war from £27,000 in 1903-4 to £692,150 in 1919-20 and £1,535, 230 by 1928-9.<sup>24</sup> This should not be viewed as 'stagnation', but rather enabled the population of those attending university to increase during the 1920s, even if at a fairly modest rate from around 40,000 between 1920 and 1925 to around 50,000 by 1926-32.<sup>25</sup> Although the total university



population increased, the proportion of students who were studying science and technology subjects fell, whilst the percentage reading arts subjects rose as demonstrated in table 7.1.

**Table 7.1 FULL-TIME STUDENTS AT UNIVERSITY IN ENGLAND AND WALES AS A PERCENTAGE OF TOTAL STUDENTS, 1920-1934**

	Arts	Pure Science	Technologies
1920 - 1924	39.8	17.0	13.5
1925 - 1929	52.3	16.9	9.3
1930 - 1934	49.9	16.9	8.9

**Source:** M Sanderson, The Universities and British Industry, 1850-1970 (1972), p. 263.

Roderick and Stephens corroborate this trend, presenting slightly different figures, but nevertheless indicating that the proportion of science and technology students declined.<sup>26</sup> However, table 7.1 accounts only for the activities of full-time students, who are shown as a proportion of the total student population in Britain. In each period, something in the region of seventy five per cent of students were full-time which leaves an important residual of part-time students who are not accounted for. It is probable that part-time students, who were often engaged in paid labour in addition to study, were more likely to be attracted to science and technology subjects which may have complemented their employment, than full-time students. In addition, as Sanderson rightly points out, there is no reason to assume that arts subjects were non-vocational. He recognises the emergence of the BA degree in commerce at universities such as Aberdeen, Edinburgh, Leeds, Reading, Nottingham and Southampton through the 1920s, and a more applied degree in industrial administration at Manchester and the London School of Economics.<sup>27</sup> In addition he notes that subjects such as languages, industrial psychology and statistics should not be dismissed as non-applied or industrially 'irrelevant' courses. Indeed, in 1916, a Board of Education committee stressed the need for an improvement in language tuition, because of its crucial importance to industry

and commerce.<sup>28</sup> Students who anticipated later careers in business and industry may be disguised by a simple categorisation of the subjects which they studied as 'science', 'arts' or 'technology'. The preponderance of arts students was also partly financial. Dyhouse outlines that in most British universities during the 1920s arts courses cost between £15 and £45 per annum whilst science courses were more expensive. Many of the L.E.A. scholarships awarded barely covered such fees, and did not stretch to maintenance.<sup>29</sup> Thus, it is perhaps not surprising that larger numbers of students took arts courses, especially when, as at U.C.L. a general science degree could be gained through the route of BA rather than the more expensive one of BSc.

Quantifying the participation of British students in science and technology subjects is one way of establishing the importance of such disciplines in British universities. Alternatively, as Sanderson shows, there were significant developments in the quality and scope of science and technology in the interwar period. He emphasises, for example, growing links between university departments and industry. U.C.L.'s Ramsey chemical engineering laboratory for example, was supported by I.C.I., Lever Brothers and Shell, Cambridge had connections with Mond and Austin, and the civic universities, in particular Manchester, were acclaimed for their links with local industry. His list of successful collaborations is extensive, and he points to only a handful of universities, Oxford, Exeter and Leicester, which did not have strong industrial links.<sup>30</sup> He also notes a growth of technical specialisms within universities in the 1920s, which leads him to state:

'This spread of interests and specialisms prompts comment..... The universities, by dealing with the various forms of engineering ....., aviation, the chemistry of fats, dyes and soaps, the food industries and nutrition, were certainly contributing to the change in industrial structure and the rise of the 'new industries'.<sup>31</sup>

This challenges the notion that education was undergoing a period of 'stagnation' in the 1920s, but rather suggests that it was a dynamic sector, which was forging links with industry, and undertaking a large degree of innovative research. However Sanderson notes that in some of the 'newer' research subjects such as electrical engineering, universities were losing ground to the research departments of firms such as G.E.C., Metro-Vickers and Siemens, and that there was a tendency to focus too much attention on research into 'older' industries such as coal mining.<sup>32</sup> This comparison of one type of provision against another is of very limited value. If the true content of education and training during the interwar period is to be established, a holistic approach needs to be adopted which does not focus on the superiority of one kind of research over another, but defines any expansion in research as important progress. The tendency of historians to consider the educational domain not as a whole, but as a series of fragmented parts, helps to explain why so many negative impressions of the 1920s and 1930s have prevailed. Given that firms which were involved in scientific research often recruited as their staff, university graduates, it is inappropriate to judge universities and companies as entirely separate entities. Graduates were normally taken on as scientists, technicians or researchers. Gospel has queried the extent to which they were given management positions within firms however, claiming that British business remained essentially conservative, choosing family members or possibly Oxbridge classics graduates to manage company affairs.<sup>33</sup>

Perhaps more importantly, the type of training which was provided by firms for non-managerial staff has been criticised for being ineffectual. Gospel notes that from the late nineteenth century there had been a gradual fall in the number of indentured apprenticeships in Britain, although this remained the main form of technical training for craftspeople. Gradually day release courses and evening instruction became more popular, and by the 1920s, few firms provided a complete 'in-firm' training.<sup>34</sup> Barnett believes that there was

widespread opposition from industry to the day continuation schools proposed in the 1918 Fisher Education Act, because of fears that they would lessen the productive capacity of school leavers by taking them out of work for approximately one day per week.<sup>35</sup> If this is a true reflection of business attitudes in the 1920s, then there is indeed a case for arguing that British industrialists were short sighted and failed to invest in future needs. Gospel agrees that day release was only grudgingly accepted by a handful of industries. The textile trade was one of the most generous in providing training opportunities, and yet only ten per cent of its employees were granted day release.<sup>36</sup> This was not the full extent of industrial training however. A survey of employer's attitudes in the interwar years showed that the vast majority favoured evening instruction in addition to employment during the day.<sup>37</sup>

‘By 1918, the pattern of technical education had been set. It was one of part-time evening instruction combined with practical experience in industry. Day students were small in number, being only 22,000 in 1921. By 1938 these numbers had been doubled but they were still dwarfed by the numbers of part-time students - 1,280,000.’<sup>38</sup>

A figure of over one million who attended some kind of part-time instruction is impressive, and signifies that focusing only on day release, gives a very narrow impression of the extent of technical training in the interwar years. The preference for evening instruction was presumably largely financial. Full productivity could be gleaned from each employee whilst all study occurred outside the working week. This was not necessarily the most effective form of training, and indeed the Malcolm Committee in 1926 reported that evening instruction was a very difficult and tiring form of study for people who were already in full time employment.<sup>39</sup> In addition, Burgess has suggested that a problem with part-time evening instruction was that few nationally recognised certificates were connected to this type of learning, which tended to undermine its credibility.<sup>40</sup>

Emmerson in contrast outlines that after 1911, many large colleges began offering college certificates in subjects supervised by the Board of Education to part-time students, and that after 1920, this gave way to a system of national certificates. The first of these was a higher and lower national certificate in mechanical engineering and was introduced in 1921. A higher national diploma was also introduced in the same year, but this could only be gained by full time study. The certificates were issued jointly by regional boards of education and the Institution of Mechanical Engineers. National certificates were also set up for electrical engineering, chemistry and naval architecture in 1926.<sup>41</sup> The polytechnic at Regent Street, began instruction for national certificates in mechanical engineering, electrical engineering and chemistry for part time evening students in the academic year 1924-25,<sup>42</sup> which does not corroborate the view that nationally recognised certificates were only available to those in full-time study. The most significant criticism is not that employers favoured part-time over full-time training, but that they preferred evening instruction over day release. This undoubtedly placed considerable stress on the employee at the expense of lower outlay costs for firms. Recent research by Marian Bartlett has indicated however, that a number of firms advocated day release and were 'positive' and 'even enthusiastic' about training. Firms within engineering, building, pharmacy and architecture were particularly progressive.<sup>43</sup> An impression that businesses were overwhelmingly apathetic towards education, training and research in the interwar years thus appears to be misfounded.

In addition to university and polytechnic growth, other areas of adult education were developing during the 1920s which appealed to a number of people who carried out paid employment during the day. After 1924, universities were able to claim government grants, not just for their full-time courses, but also for 'extension classes'. This ensured that a larger number and social mix of people could take part in university study during vacations or at weekends than might otherwise have been catered for. The Workers Educational

Association (W.E.A.) also gained a government grant,<sup>44</sup> which further increased educational opportunity for working-class people. The popularity of the W.E.As was significant with the number of students increasing from 3,404 to 14,953 between 1918 and 1938, and the number of associations from 147 to 882.<sup>45</sup> Like the universities, the W.E.A.s also saw a swing in their curricula in favour of the arts. However, unlike the universities there was no decline in the number of science students, in fact sciences grew in popularity, although at a slower rate than arts subjects. Social science and political subjects were the main areas of decline. The suggestion has been made that this marked the emergence of working class apathy,<sup>46</sup> alternatively the growth of opportunities for working people in areas such as education, although still far from equal, may have eased the sense of need to protest and embrace political ideology. Other providers of adult education were the Y.M.C.A. and Y.W.C.A., the co-operative movement, a number of private residential colleges and a still significant, although declining number of adult schools.<sup>47</sup> It is not necessary to describe the activities of each in detail, however, their existence shows that the government and private organisations were taking the issue of adult education seriously, recognising perhaps that greater opportunity during a period of economic dislocation was beneficial. The weakening of interest in social reform and religion and the increasing popularity of science and arts subjects may also have resulted from the poor economic climate of the 1920s, and the struggle to find work, which encouraged adults to gain additional training. Gradually, the work which previously had been carried out by the smaller organisations was squeezed, so that by the 1930s the W.E.A. and the university extension movement provided the core of adult education.<sup>48</sup>

Although it cannot be argued that the 1920s was a period of rapid growth in education, the case for total stagnation or 'missed opportunities' is not substantiated especially when one considers the severe budget restrictions and economic climate of the 1920s. The extent to

which education and training opportunities changed for women during the 1920s is not clear at present, neither is the issue of whether educational provision for women matched the mainstream trends. This will be the focus of the later part of this chapter, and will also be considered in closer detail in the following studies of U.C.L. and the polytechnic at Regent Street. Firstly, a brief account of women's changing social and political position after 1918 is provided as a context for understanding their role and participation within the various areas of education and training.

### **WOMEN AND SOCIETY DURING THE 1920s**

A number of important breakthroughs were made by women in the immediate post-war period, most of which are well researched. In 1918 for example, women aged thirty and over were awarded the right to vote for the first time, creating an important shift in the balance of power between the sexes.<sup>49</sup> The Matrimonial Causes Act of 1923, which allowed women the same grounds for divorce as men, was an important step towards greater equality, and offered a way out of the misery of an unhappy marriage for those women who chose to use it,<sup>50</sup> although the stigma attached to divorce remained high. In addition, a further decline in the birth rate during the 1920s, meant that in theory women had more freedom to engage in activities other than childbearing and domestic duties,<sup>51</sup> which may have contributed to a rise in the quality of life for many women. This was further aided by a growth of consumer durables which helped to reduce the drudgery of household tasks. Pollard refers to the availability of electric lighting instead of candles, and gas cookers rather than coke ranges as: 'standard equipment in working-class homes'.<sup>52</sup> Appliances such as irons and vacuum cleaners, however, remained largely the luxury of middle-class women. Finally Solomon makes reference to the changing image of women in the 1920s. She notes changes in fashion such as shorter skirts and bobbed haircuts, the growing popularity of

smoking with the introduction of cigarettes on a mass scale, drinking in public and attending dance halls.<sup>53</sup> All of these changes imply that a relaxation of social values was taking place and that more women were beginning to acquire greater independence and opportunities, and to enjoy themselves.

However not all women approved of the image of the flapper. Solomon demonstrates that some of the feminists who had been active in the pre-war period, regarded it as frivolous, and representative of a demise in women's moral superiority over men. Many feared that this new reckless and carefree female image would damage women's fight for equality.<sup>54</sup> Indeed, Mellman points out that politicians and the press were keen to regard flappers as frivolous, childish and inconsistent, and therefore there was every reason not to extend the vote to women aged between twenty one and thirty. The Mail stressed the danger that these women would invariably vote Labour because of their ignorance.<sup>55</sup> The fact that most working-class women could not afford the life of the flapper, but were also potential Labour voters seems to have escaped notice. Young and female became synonymous with 'flapper' although this was far from accurate. However, the image of young women that was frequently presented added fuel to the argument against extending the franchise to those under the age of thirty.

In spite of such attitudes, women of the 1920s were certainly setting a new agenda, showing an interest not just in the 'equality' of the right to vote, the fight to enter higher education and equal pay in the workplace, but also in equal rights with regard to sexuality, leisure and relationships. Coupled with this was a growing rebellion against the values of the previous generation of women, highlighting that the new female activities of the 1920s were as much to do with 'youth' as they were to do with 'gender'. Tuke commented on the differences between female university students before the war and after, claiming that women in the



1920s tended to be more involved in the whole student experience, joining clubs and societies in addition to carrying out their studies, than previous generations who had largely confined themselves to serious academic study.<sup>56</sup> It should not be accepted that the fight for equality had subsided, but that the first generation of university women along with the early suffragists had needed to prove their cause by seriousness and dedication and that the women of the 1920s, having received a greater level of acceptance in public life, took the fight for independence to a new level demanding freedom and enjoyment. Thus, the pursuit of equality had not subsided, rather it had taken on a new form.

Hand in hand with the flapper went the increasing sexual independence of women, aided by improvements in contraception and early advice on birth control such as that offered by Marie Stopes' clinics. As with reactions to women's changing image, not all regarded this new independence as emancipating. Jeffreys believes that an increase in contraception led to a reduction in men's respect for women and that the glorification of spinsterhood characteristic of the pre-war years was lost, along with the campaigns and demands of many women for the transformation of male sexual behaviour.<sup>57</sup> Her argument is rather polemical, but she does recognise that the growing availability of contraception in the interwar years enabled women to relax and enjoy sex without fear of pregnancy.<sup>58</sup> For the majority of women, who did not wish to embark on a life of spinsterhood, such developments were undoubtedly liberating, and were partly responsible for a reduction in the birth rate. In addition, Solomon argues that far from tying women to men, the growth of sexual freedom, and changes in image and public behaviour of the 1920s, were a demonstration of female assertiveness. Women were not highly promiscuous in this period, she claims, but were beginning to make their own demands and enjoy relationships without the need to be tied to one man.<sup>59</sup> Mellman argues that although government and the press portrayed young women during the 1920s as frivolous and erratic, there was significant fear of their

independence, both sexually and in public life. For the first time, terms such as 'sex war' were used by leading male figures and the press, as women challenged men in the workplace, politics, and education.<sup>60</sup> One must accept that they showed a degree of assertiveness which confronted and upset the status quo.

Just as there is disagreement over the contribution of the flapper to female equality, so it has been pointed out that other factors such as winning the right to vote in 1918 were not totally emancipating. Cheryl Law has pointed out that the gaining of partial franchise by women in 1918, although a breakthrough, left five million women disenfranchised; those under the age of thirty, those who 'lived in' at work and those who lived with parents or shared a property with other women.<sup>61</sup> In addition, women who stood in elections were frequently offered 'unwinnable constituencies' and although the number of women who gained seats increased between 1918 and 1924, growth was slow. This meant that whilst women had the right to vote, they were rarely represented by another female.<sup>62</sup> In 1928, all women aged twenty one and over became eligible to vote, an extremely relevant achievement, even if it was a little slow to come about.

A number of problems are inherent in accounts of women's emancipation which compare women who fought for the right to vote, with those who lived in the aftermath of the legislation of 1918 and 1928. Many historians have made this comparison however, and it is important to outline their views and offer a critique of their arguments given that the women we are interested in attended higher education establishments both before the First World War, and after 1918. Martin Pugh believes that the strength of the women's movement of the pre-war era declined in the interwar years as women no longer had a focal issue to fight for.<sup>63</sup> This view is problematic for two reasons. Firstly, he assumes that the women's movement was unified and focused almost entirely around the franchise issue before

the war. Sandra Holton has shown that this view resulted from the fact that the pre-war suffrage movement has been portrayed as a crusade for 'women's rights' under the middle-class banner of the Women's Social and Political Union (W.S.P.U.). Little attention has been paid to 'democratic suffragism', a broad movement which desired female suffrage as part of a wider democratisation of British society, and improved conditions for working-class people generally. The majority of the women involved in this cause were to be found in the National Union of Women's Suffrage Societies (N.U.W.S.S.) and the Labour Party, but a large proportion were spread among other organisations, helping to explain why they have featured so little in accounts of suffragism.<sup>64</sup> Thus a greater impression of female unity before the First World War has been presented than was actually the case. Because of clashes with middle-class, idealistic feminists, 'democratic suffragists' were increasingly excluded from W.S.P.U. policymaking and left to form dissident organisations such as the Women's Freedom League and the United Suffragists.<sup>65</sup> This has helped to secure the impression that middle-class women were at the forefront of suffragism. Secondly, it is hardly surprising that after the gaining of partial franchise in 1918 the women's movement retreated from a narrow focus and embraced a broader range of issues relating to women's work, health, welfare and political rights. This should be heralded as a triumph rather than a regression. Cott articulates this broadening of feminist interest as follows:

'What historians have seen as the demise of feminism in the 1920s was, more accurately, the end of the suffrage movement and the early struggle of modern feminism. That struggle was, and is, to find language, organization and goals adequate to the paradoxical situation of modern women, diverse individuals and subgroups'.<sup>66</sup>

Thus, she highlights that offering a definition of 'women' in the 1920s is complex, because they were not a homogeneous group with shared aims and aspirations. Indeed much research has focused on the increasing differences of opinion during the 1920s between 'equalitarian' feminists, those who believed that women were equal to men and therefore should strive to

carry out the same roles,<sup>67</sup> and 'welfare feminists' who, in contrast, sought to express the vital difference between men and women, showing that each had different roles to perform, but that neither function was of higher or lower status. In reality there was much overlap between the two and many areas of common ground which merely highlights the problem of trying to categorise women's desires and objectives. The welfare feminists of the 1920s still believed in women's right to gain equality of treatment, but felt that this could be achieved by gaining recognition for the importance of their difference rather than by attempting to enter the 'male domain', and compete on male terms. The issues which they embraced were the call to protect women against dangerous employment, the campaign for family allowances for mothers and a promotion of birth control clinics and infant welfare services.<sup>68</sup>

Mackinnon has outlined the argument that educated women during the 1920s and before the First World War were non-radical, had little involvement in the women's movement, and were characterised by their non-militancy. It has been suggested, on this basis, that like the welfare feminists, women who followed an educational route were surprisingly 'non-feminist'.<sup>69</sup> However, a wider definition of feminism, which Mackinnon herself adopts, allows for the vital role played by such women in establishing a new field of female involvement by their efforts to gain a university education and creating opportunities for women of future generations. Even if such women were rarely involved in political campaigning, their contribution to the women's movement was far from negligible. Rogers, in contrast, argued that after 1918 the majority of women in higher education were connected with the suffrage and political wing of the women's movement, although they tended to be very moderate.<sup>70</sup> Thus it seems that educated women did aspire to female emancipation in a number of ways and their dedication and perseverance is well emphasised by considering the different areas of education and training in the 1920s, and women's struggle to be involved at all levels.

## EDUCATION AND TRAINING FOR WOMEN, 1918-1930

The changes in the school system, incorporated in the Fisher Education Act of 1918 which were outlined earlier, not only failed to provide secondary education for large numbers of working-class children, but, it has been argued, especially for working-class girls. Although girls could officially enter secondary schools either by payment of fees or by scholarship, first introduced in 1907, they were in practice, less likely to gain scholarships than their male contemporaries.<sup>71</sup> This may have been influenced by traditional beliefs, for example those stressed by the Board of Education Consultative Committee as late as 1923, that vital recognition should be paid to the biological differences between men and women and that academic education was not always suitable for girls.<sup>72</sup> For middle-class, fee paying girls who succeeded in entering secondary education however, a reasonably academic education could be gained. Able working-class girls normally studied in the new vocational 'central schools' after gaining entry by examination.<sup>73</sup> The intention was to provide a high level of technical and practical education and training for able working-class children, although the fact that such schools were registered under the elementary as opposed to the secondary code of regulations shows that the training they received was regarded as inferior to academic education. The constant refusal of governments to include central schools under the secondary code of funding, meant that frequently they suffered from poor equipment and high pupil-teacher ratios.<sup>74</sup> In addition, King has demonstrated that the curriculum of the central schools was often gendered, and that women were generally confined to training for low skilled office work and domestic service, although they were amongst the more intelligent of their peers.<sup>75</sup> This, and the fact that girls struggled to gain places in secondary schools, meant that if they wished to enter higher or further education at a later date they found it difficult to do so. However, not all central schools adopted such an obviously gendered education policy, and indeed many of the schools were co-educational, and offered a similar range of science, mathematics and technology options to boys and

girls.<sup>76</sup> For those fortunate enough to gain a scholarship place to a secondary school or able to pay the fees, the opportunity to progress to higher education was better.

After 1920, the Board of Education set up an additional scholarship scheme which enabled pupils from secondary schools to gain free university places.<sup>77</sup> In theory this was a move towards equality, allowing those who could not afford high university fees the possibility of an advanced level of education. The policy was much more egalitarian than the scholarships to secondary schools, with the Board of Education insisting initially that scholarships should be awarded to males and females on a fifty-fifty basis.<sup>78</sup> However, by 1930 the policy of equal scholarship was abandoned because of pressure from various examination boards. They argued that men who sat their examinations and passed were frequently turned down because there were so few places for so many candidates, whereas because the number of female candidates was much smaller, nearly all who passed the examinations gained a place, even though they sometimes passed with lower marks than men.<sup>79</sup> Although the Board argued that the scheme was not designed to provide competition between women and men but rather, competition within each sex group,<sup>80</sup> it was eventually forced to abandon the equal ratio policy.

Interestingly, two of those candidates who were grudgingly accepted, later achieved fame as the novelist, Mary Renault, and the head of the North London Collegiate, Eileen Harold.<sup>81</sup> One is left wondering what some of those women turned down might have achieved, given the opportunity. The result was that, despite hopes of a more egalitarian university entrance system, the bulk of women attending university during the 1920s did not gain state scholarships. As late as 1926, London as a whole received only forty scholarship places from the Board of Education to be shared between men and women at a range of different colleges.<sup>82</sup> Margaret Tuke, writing in 1928 however, suggested that by the 1920s, around

fifty per cent of all women students held some kind of scholarship, awarded in some cases by the state, but normally by counties or the university itself. Because of this, she stated, women who were less affluent than those who had attended universities before the war, were able to gain a higher education, and normally did so, specifically to acquire training for later careers.<sup>83</sup>

A pamphlet, published in 1925 by G S M Ellis however, claimed that public scholarships were much more commonly awarded to men than women: 'The supply of public scholarships for women was lagging behind the demand for higher education in a most alarming manner.'<sup>84</sup> Very few Local Education Authorities, the main source of scholarship funding, provided an equal number of scholarships for boys and girls, and most overtly favoured boys. This was, in part, because scholarships were normally offered only to children who had attended a secondary school, and the provision of such education for girls was still inferior during the 1920s. Many boys' schools also made special provision for their able pupils who were to go on to university, in the form of endowments, which girls' schools were rarely in a position to match.<sup>85</sup> On this basis, it is surprising that around fifty per cent of women at universities held some kind of scholarship by the 1920s. It is probable that the main source of funding for such women came from the Board of Education, which from 1910 introduced grants for students who agreed to follow a teaching career after graduation in return for receiving payment of fees for a three year degree, one year of teacher training and also a maintenance allowance.<sup>86</sup> Maintenance was paid at a rate per annum of £35 for men and £25 for women who lived in hostels and £15 and £10 for those who did not.<sup>87</sup> Whilst this was an important source of funding, it forced many, who may not otherwise have chosen a career in teaching into this vocation. In 1911 the Board of Education stated:

'Candidates must as a condition of admission, give an undertaking to the Board for the purpose of securing that in return for the grant payable under this statement they will complete their training, and thereafter actually follow

the profession of a teacher in an approved school for such period, or periods, or repay to the Board such proportion of that grant, as may respectively be specified in the undertaking.'<sup>88</sup>

The undertaking was supplied on application. Not all women at universities had pledged to become teachers, but those who had not, unless they had been fortunate enough to gain an L.E.A., university or state scholarship, would have been reliant on private funding. Such women would necessarily have been of upper middle-class status given that university fees during the 1920s were so high, as the following chapter will demonstrate.

In spite of the Board of Education Scholarships to intending teachers, it seems that the total female university population remained small in comparison to the male figure. Sutherland shows that only twenty three per cent of the total university population by 1938-9 was female. This was partly due to the dearth of scholarship places offered to women, possibly a result of poor female demand for higher education although no specific evidence exists to support this, but primarily, she argues, because most of the women's colleges remained small throughout the interwar years, unable to attract large benefactors and therefore underfunded and unable to expand.<sup>89</sup> This is corroborated by an article written in 1922, which revealed that the five women's colleges at Oxford contained only 700 female students in total. The author, Phoebe Sheavyn argued that this was largely a result of underfunding and a dearth of benefactors.<sup>90</sup> Halsey and Anderson, who both quote the statistics collated by the University Grants Committee (U.G.C.), also show a female rate of participation of twenty three per cent for 1939, under one quarter of the university population, which altered very little up to 1960.<sup>91</sup> Interestingly though, Halsey states that in 1920 women constituted under one third of all students in Britain, thereby implying that female participation declined at some point during the interwar years.<sup>92</sup> In fact, the U.G.C. return for 1924-25 showed that of all students in Great Britain, twenty nine per cent were female, thus their participation had



not fallen by this date. By 1929-30 however, the figure had fallen to 26.8 per cent.<sup>93</sup> This shows on the one hand that the notion of a 'linear progression' through time was not the case with regard to female university education, but also that the blame cannot rest with the 1920s alone.

However, the U.G.C. figures should not be accepted at face value. Firstly, for the years before 1920, the U.G.C. did not provide figures of students at Oxbridge. Female participation at these two universities was particularly low due to a range of restrictions, not least the refusal to award women with degrees, which meant that the inclusion of Oxbridge figures after 1920 gave an appearance of a falling rate of female participation, rather than representing a genuine decrease.<sup>94</sup> The problem of including figures for Oxford and Cambridge after 1920 but not before is made clear by showing that between 1929 and 1930 women comprised only 12.5 per cent of the student bodies of Oxford and Cambridge, whereas at London they accounted for nearly thirty eight per cent and at the new redbricks, over forty six per cent.<sup>95</sup> This, it seems, had little to do with female choice, but resulted from restrictive college policies. In 1921, the number of women students entering Cambridge was limited to 500, around ten per cent of the university population, whilst at Oxford, in 1927, a quota was set on the number of women who could enter at 740, or seventeen per cent of the university population.<sup>96</sup> The U.G.C. figures showed that in 1924-1925 803 women attended Oxford, and thus that the new regulations in 1927 were regressive, and led to a contraction in female involvement.<sup>97</sup> There are obvious problems in measuring trends of female university attendance across decades, when significant changes in methods of recording took place.

In addition, the U.G.C. figures covered all English, Scottish and Welsh universities, and also colleges of technology. Women's participation in the latter was minute ranging from 1.6 per cent of all students in 1919-20 to 5.1 per cent by 1929-30.<sup>98</sup> It is not very helpful to

include such figures in calculations of women's role in higher education, when entry to such colleges was very difficult and women's participation was well below their average. If such colleges are excluded, along with Oxford and Cambridge, the female proportion of full-time students actually rose from 28.7 per cent in 1919-20 to 31.4 per cent by 1929-30. Further problems occur when attempting to explain a falling rate of female university participation after 1920. Firstly the proportion of women as part-time students grew between 1920 and the 1960s, particularly in England and Wales, implying that on balance women's overall rate of participation probably remained quite consistent.<sup>99</sup> Secondly, after the 1920s there was an increase in the number of commonwealth students studying in British universities, of whom the vast majority were male, which skewed the figures still more.<sup>100</sup> On balance, it seems probable that women accounted for more than one quarter and possibly one third of the student university population in the interwar period, with higher levels of participation at the more egalitarian institutions.

Edwards shows that for many women, teacher training college rather than university was a preferred destination. She suggests that this was due to a desire for femininity, all female company, an emphasis on free time spent engaging in craft-work such as needlework, and training to work with children. In other words she argues that such colleges offered an extension of domestic and familial values.<sup>101</sup> This seems, however, an incomplete explanation for women's decisions to study at teacher training college. Edwards does recognise that the gradual phasing out of the pupil teacher scheme during the early years of the twentieth century meant that teacher training college became the central learning environment, teaching gradually came to be recognised as a profession, and more middle-class women began to enter it,<sup>102</sup> especially following the growth of secondary schools after 1918. In addition, the fact that training college courses lasted for only two years, meant that parents and young women themselves often favoured this form of education over longer

university courses. Her most valuable comment is that unlike other emerging professions of the twentieth century, teaching did not involve such direct competition with men, and therefore was viewed favourably by women who were serious about pursuing a career.<sup>103</sup> For most, teacher training offered the means of entry into a profession which was reasonably accessible to women. The seriousness with which women regarded their professionalism, at a time when married women were being excluded from teaching, is shown by the fact that only fifty per cent of the women trained at Bishop Otter ever married,<sup>104</sup> which rather undermines Jeffreys' argument that the cause of spinsterhood declined in the interwar years. In addition, some training colleges were affiliated to universities, often as departments of education, and offered the option of studying a degree, followed by a one year teaching diploma. Women who became teachers via this route spent four years in education, another example that they treated their training seriously and wished to gain useful qualifications for later professional life.<sup>105</sup> This method of training was more commonly followed by women who wished to become secondary teachers.

The extent of provision of adult education for women in the 1920s is unclear. Kelly points out that the Y.W.C.A. received no state funding for education whereas the Y.M.C.A. did. This, however is not highly significant, because the Y.M.C.A. did not set out to compete with the universities or the W.E.A., and the level of education it offered young men was non-vocational and informal.<sup>106</sup> There is no indication that university extension and the W.E.As were any more restricted to women than other areas of education, although unfortunately there are no figures to support this. Certainly before the First World War, university extension was more popular amongst women than men, often because more formal types of education were closed to them. Halsey has indicated that in the field of 'further education' in general there was a trend towards a greater numerical presence of women over men between 1910 and the 1960s, helped by the ability to study on a part-time basis, which

allowed women to participate in day time employment, or domestic duties if they needed.<sup>107</sup> Polytechnic provision in particular seems to have offered women good opportunities, a contention which will be explored in detail in chapter nine.

Although the state offered little funding for female education, it did initiate one particular programme, the unemployed training schemes for women. These schemes did not pay women unemployment benefit whilst they were enrolled. In contrast, women received a small maintenance allowance of 2s 6d per week<sup>108</sup> which highlights the fact that women's unemployment was not regarded as a serious problem. These schemes were based entirely on training for domestic service and were highly resented which was shown by a reluctance to enrol. The schemes have been criticised for their gender and their class bias, and the fact that the state regarded women as a homogeneous group, suited to domestic service and gave them little opportunity to receive alternative training.<sup>109</sup> The only other state-regulated schemes were the 'interrupted apprenticeships', which provided state funding for returning soldiers who had been apprenticed before the war and needed to complete their training. In addition some women gained apprenticeships, but these were all in laundry work, domestic service, needlework and other 'traditionally female' trades. The demands of the Women's Industrial League, who in 1920 sent a deputation to the Prime Minister in the hope that he might consider admitting women to building apprenticeships, and consider equal pay with men, unfortunately fell on deaf ears.<sup>110</sup> Unemployed women, reliant on state funding, therefore, did not receive many of the benefits in education and training that middle class or well educated women did. Private apprenticeships also discriminated against girls. In 1925 104,649 boys were apprenticed, compared to only 6,065 girls.<sup>111</sup> Some women did attempt to secure management positions in trades such as laundry work, especially if they had secured a place at secondary school and left with the school certificate at the age of sixteen. However, Burgess outlines the struggle they had to do so. Three years of training were

required for a managerial position, but the National Federation of Launderers was unwilling to allow women to practice as managers until they were at least twenty one years old. On this basis, two years had to be filled between school leaving and training, and for many young women, and especially their parents, economic necessity prompted a need to find immediate employment, and therefore to miss the opportunity.<sup>112</sup>

Education and training during the interwar years were therefore areas of frustration for many working-class girls, although for adult working-class women the developments in further education offered some hope. For most however, inadequate levels of schooling and a lack of state funding meant that the prospect of gaining a university education was minimal, although more possible than before the First World War. Opportunities for middle-class women who sought a higher education improved however, with increased funding, some scholarships and improvements in secondary education which made the passage to university easier. It seems that working class girls faced the greatest obstacles within education and training, and made the least progress, although some did gain scholarship places or attend adult education classes. For middle-class or highly intelligent women who managed to obtain university places, opportunities were potentially high, with a growth of new industrial sectors seeking skilled personnel and a wider range of university subjects on offer than in the pre-war period. The following chapter considers the extent to which women participated at U.C.L. in the 1920s, and the range of subjects in which they were involved. The results will be considered in the light of the restrictions which have been outlined, which made women's route to higher education cumbersome.

## NOTES TO CHAPTER SEVEN

1. H F Gospel (1991), p. 21.
2. E G West (1970), p. 183.
3. C Barnett (1986) p. 210, p. 218 and p. 223.
4. P Gordon, R Aldrich and D Dean (1991), pp. 59-60.
5. M Sanderson (1988a), p. 43.
6. J S Maclure (1970), p. 9; (1979), p. 171.
7. P Gordon (et al), op.cit, p. 49; J S Maclure (1979), p. 171.
8. K Burgess (1993), p. 370; M Bartlett (1995), p. 24.
9. P Gordon (et al) op.cit, pp. 49-50; J S Maclure (1979), p. 174; (1970), p. 119.
10. P Gordon (et al) op.cit, p. 50.
11. Ibid, p. 51.
12. Ibid, p. 52.
13. Schools were not the only area of education to be hit by the Geddes Axe. During the early 1920s, the government funded a number of schemes which aimed to train and provide work for unemployed workers. For those who wished to train for professional work, individual grants were available. However, between 1926 and 1930, these were suspended. For a detailed account of this and other state unemployment schemes see J Sheldrake and S Vickerstaff (1987), pp. 14-17.
14. J S Maclure (1970), p. 111.
15. M Locke (1978), pp. 20-1.
16. Ibid, p. 22.
17. Ibid, p. 20.
18. Ibid, p. 22.
19. S Worden (1986), p. 32.
20. A Fowler & T Wyke (1989), p. 5 and p. 11.
21. A H Halsey (1972), p. 205.
22. M Bartlett, op.cit, p. 21.
23. J S Maclure (1970), p. 117.
24. M Argles (1964), p. 71.
25. M Sanderson (1972), p. 243.

26. G W Roderick and M D Stephens (1982), p. 24, give figures showing a decline of science students from 19.3% of the total number of students in 1922 to 16.2% by 1938. The proportion of technology students also fell from 12.5% to 11.3% of the total over the same period.
27. M Sanderson (1972), p. 264.
28. Ibid, pp. 266-8; M Bartlett, op.cit, p. 60.
29. C Dyhouse (1995), p. 28; G S M Ellis (1925), p. 33.
30. M Sanderson (1972), pp. 251-7.
31. Ibid, pp. 251-4 and p. 258.
32. Ibid, p. 259.
33. For a full discussion of the links between British business and academia, see H F Gospel, op.cit, pp. 21-3; M Sanderson (1972), pp. 249-50.
34. H F Gospel, op.cit, p. 19 and p. 24; M Bartlett, op.cit, p. 65 and pp. 78-87.
35. C Barnett op cit, p. 210.
36. H F Gospel op cit, p. 24.
37. K Burgess op cit, p. 373.
38. G W Roderick and M D Stephens op cit, p. 25.
39. Ibid, p. 25.
40. K Burgess op cit, p. 374.
41. G S Emmerson (1973), p. 304.
42. Polytechnic prospectus, 1924-25, pp. 51-2, University of Westminster Archives.
43. M Bartlett, op.cit, pp. 132-58.
44. T Kelly (1970), p. 268.
45. Ibid, p. 269.
46. Ibid, p. 274.
47. Ibid, p. 268. and pp. 278-84. The number of adult schools declined from 1,900 in 1913 to 1,096 by 1937.
48. Ibid, p. 286.
49. N A Ferguson (1975), p. 56.
50. Ibid, p. 56.
51. Ibid, p. 56; P Thane (1990), p. 283.

52. S Pollard (1992), p. 152.
53. B Solomon (1985), p. 158 and p. 160.
54. Ibid, p. 158 and p. 161.
55. B Mellman (1988), p. 29 and pp. 31-2.
56. M Tuke (1928), pp. 72-3 and pp. 74-5.
57. S Jeffreys (1985), pp. 158-61.
58. Ibid, p. 160.
59. B Solomon op cit, p. 158 and p. 161.
60. B Mellman op.cit, pp. 26-8.
61. C Law (1993), unpublished paper.
62. Ibid.
63. M Pugh (1992), p. 47-51 and p. 67.
64. S Holton (1986), pp. 5-7.
65. Ibid, p. 66.
66. N Cott (1987), p. 10.
67. O Banks (1981), pp. 176-7.
68. For a full debate on these issues and the differences of opinion of equalitarian and welfare feminists see: O Banks, op.cit, pp. 169-77; H L Smith (1990) pp. 49-59; S Jeffreys, op.cit, pp. 152-4; P Thane (1991a), pp. 96-7 and p. 109.
69. A Mackinnon (1990) pp. 42-3.
70. A Rogers (1938), p. 107.
71. P Gordon (et al) op cit, p. 132.
72. C Dyhouse (1978b), pp. 305-8.
73. P Gordon (et al) op.cit, p. 132.
74. S King (1990) pp. 77-9; C Manthorpe (1986), p. 195.
75. S King, op.cit, pp. 81-7.
76. Ibid, p. 82.
77. A D Harvey and A Beedell (1992), article from The Guardian, Tuesday 1 September.
78. ED 72/4, London Examining Board, letter 7 July 1920 from Board of Education, P.R.O.



79. Ibid, letter, 6 August, 1921 from the Senate of the University of London.
80. Ibid, Letter, 20 July, 1921 from the Board of Education.
81. A D Harvey and A Beedell, op.cit.
82. ED 72/4, London Examining Board, letter, 17 February 1926 from Board of Education, P.R.O.
83. M J Tuke (1928), p. 76.
84. G S M Ellis (1925), p. 9.
85. Ibid, pp. 31-2.
86. Ibid, p. 33; C Dyhouse (1995), p. 20; M Tylecote (1941), p. 135.
87. SPR. MIC.E. 291, parliamentary papers, 1911, LIX, pp. 2-3 of section beginning p. 17, British Library.
88. Ibid, p. 6 of section beginning p. 17.
89. G Sutherland (1990), p. 47.
90. P Sheavyn (1922), pp. 19-20.
91. A H Halsey (1988), p. 290; R D Anderson (1992), p. 23.
92. A H Halsey op.cit, p. 290.
93. U.G.C., 3/6, pp. 8-9 and U.G.C. 3/11, pp. 8-9, Returns from Universities and University Colleges in Receipt of Treasury Grants (1924-25) and (1929-30), P.R.O.
94. G S M Ellis, op.cit, pp. 15-16.
95. A H Halsey (1972), p. 205. The earlier edition of Halsey's book is used here, because the second edition, 1988, provides less detailed statistics and commentary for the interwar period.
96. C Dyhouse (1995), pp. 239-40; F Perrone (1993), p. 358.
97. U.G.C., 3/6, op.cit, pp. 8-9.
98. A H Halsey, (1972), p. 205.
99. G S M Ellis, op.cit, p. 20.
100. A H Halsey, (1972), p. 204.
101. E Edwards (1993), p. 277 and pp. 281-2.
102. Ibid, p. 278.
103. Ibid, p. 278.
104. Ibid, p. 285.

105. J B Thomas (1978), pp. 255-6.
106. T Kelly op cit, pp. 276-7.
107. A H Halsey, (1972), p. 205.
108. J Sheldrake and S Vickerstaff op cit, p. 16.
109. Ibid, p. 16; G Braybon op cit, pp. 221-2.
110. P.R.O., LAB 2/1226/ED 937, Ministry of Labour deputation (1920).
111. M Bartlett, op.cit, p. 121.
112. K Burgess op cit, p. 377.

## **CHAPTER EIGHT:        SCIENTIFIC EDUCATION FOR WOMEN    AT UNIVERSITY COLLEGE LONDON, 1918-1930**

### **SOURCES AND METHOD OF RESEARCH**

The sources used for this chapter were located entirely in the Records Office at U.C.L., and were very similar to those consulted for the pre-First World War period, although the presentation of the material was slightly different. The published college calendars were again used as the basis of investigation because they provided a full list of students of the college and the courses which they studied in the period 1918-1930. However, unlike the pre-war period, the number of students in each subject area classified by sex was already calculated, and presented in tabular form at the end of each calendar. This speeded up the process of collecting the information, because it was no longer necessary to count every entry, of which there were well over one thousand for each year. It also eradicated the problem, which was encountered for the pre-First World War period, of undercounting by describing as 'women' only those students whose first names were given in full, or whose names were preceded by 'Miss' or 'Mrs'. This probably excluded a number of women who were listed by their initial rather than their first name in the pre-war study. The results of this exercise demonstrated the total number of students at U.C.L. and the female proportion during the 1920s. In addition, because the data was broken down by faculty it was possible to establish the subject areas in which women's participation was most significant in numerical and proportional terms.

We are not only interested in a presentation of the numbers of women who studied certain subjects, in addition the chapter seeks to explain why this was so. Female participation fluctuated, and at times was even volatile, thus it was essential to understand the reasons for this. This task was aided by reference to faculty minute books, minutes of the college

committee and annual reports. These enabled a more qualitative impression of women's experiences at U.C.L. to be gained, whilst also shedding some light on the reasons for peaks and troughs in female participation. The names and numbers of graduates were no longer included in the college calendars after 1914 as they had been in the pre-war period. However, lists of graduates were found in U.C.L.'s Annual Reports. These enabled the study to be carried out in much the same way as it was in the earlier period, as each graduate was listed by full name if female, and by initial if male. Thus, by counting all these names, a straightforward classification by sex could be obtained. Each annual report gave a list of graduates for the previous year only, which meant that the problems of duplication, sometimes faced when using cumulative figures, were eradicated. Before these research findings can be discussed, a brief outline of U.C.L.'s development after 1918 should be provided.

### **THE DEVELOPMENT OF U.C.L. DURING THE 1920s**

By 1913, the period of radical change regarding the admission of women to U.C.L. was subsiding, and women were generally accepted into most faculties of the college. Nevertheless, a few barriers were still to be broken down. In 1917, women were admitted to the faculties of medical science and engineering for the first time, and in 1918 gained entry to University College Hospital Medical School.<sup>1</sup> Finally, the most heavily guarded of the male professions were beginning to open their doors, enabling women to study subjects which would qualify them to enter a range of occupations which had formerly been very restricted to them.

Bellot notes that during the 1920s, the range of subjects which U.C.L. offered increased, enabling a greater number of men and women to enrol. The growth of arts subjects in

particular was impressive, with the introduction of new schools of librarianship and journalism in 1919, and the development of Scandinavian and Dutch studies.<sup>2</sup> He emphasises, in addition, that U.C.L. embarked upon a number of building programmes which meant improved facilities, and physical capacity. An anatomy building, for example, was opened in 1923,<sup>3</sup> and new hydraulic workshops were built.<sup>4</sup> Such developments helped to account for a huge growth in the number of students attending University College after 1918, as shown in table 8.1 below. In addition, Bellot recognised another feature of student growth after 1918: an increase in the number of degree students. In 1900, for example, only thirty seven were enrolled for bachelor's degrees at U.C.L., whereas by 1925, this figure was 216.<sup>5</sup> He suggests that this was primarily because during the nineteenth century U.C.L. had very little influence within the University of London because it was not a recognised school. By the 1920s, after the 1905 University College (transfer) Act however, the college was growing to be more prestigious, and able to attract students to read solely at U.C.L., in order to obtain a University of London 'internal' degree.<sup>6</sup> These changes were of potential importance to women, and the following discussion considers the extent to which women benefited from improvements in the curriculum and the degree to which they were represented in various subject areas.

## STUDENTS OF U.C.L.

The participation of students at U.C.L. between 1918 and 1930 is quantified in table 8.1. This table excludes evening students and postgraduate research students, to allow close comparison with the figures provided for the pre-war period. Although evening classes in education, bookkeeping, elocution, and a wide range of academic subjects were operating regularly from 1891,<sup>7</sup> the first list of evening students was not included in the college calendars until the academic year 1913-14.<sup>8</sup> Therefore, it was not possible to obtain figures

of evening students for the pre-war period. Table 8.1 provides details of students in the faculties of arts, science, medical science, engineering and laws.

**Table 8.1 STUDENTS OF U.C.L., 1918-1930**

<b>Year</b>	<b>Total no. of students</b>	<b>No. of female students</b>	<b>Female students % of total students</b>
1918-19	1,193	522	43.7
1919-20	1,769	688	38.9
1920-21	1,976	796	40.3
1921-22	1,949	840	43.1
1922-23	1,864	888	47.6
1923-24	1,772	857	48.4
1924-25	1,911	941	49.2
1925-26	1,911	942	49.3
1926-27	1,938	944	48.7
1927-28	2,002	967	48.3
1928-29	2,078	970	46.7
1929-30	<u>2,220</u>	<u>1,009</u>	<u>45.4</u>
<b>Average</b>	1,882	863	45.8

**Source:** College calendars 1918-1930, U.C.L. Records Office.

If we compare the figures shown here with those presented in table 3.1, it appears initially that the total number of students at U.C.L. had risen significantly by 1930, to almost double its 1913 figure, and was four times larger than that of 1873-1877. However, the faculty of medicine was deliberately excluded from the pre-war study, on the basis that it was closed to women until 1917, whereas during the 1920s a number of women studied in this faculty and therefore are included. Thus the actual number of men and women cannot be compared over the two periods and a more useful comparison is to consider the rate of female participation as a proportion of the total student body.

The average rate of female participation between 1918 and 1930 was 45.8 per cent, a very impressive figure, and not one that is often recognised. Given that the 36.8 per cent average

for the pre-war period was considered high, this level of participation, which at its peak in 1925-26 rose to 49.3 per cent, virtually half the student body, is highly significant. It is difficult to judge how typical U.C.L. was in this respect. Halsey has shown that the female proportion of university students across the UK in 1920 was just under thirty per cent, a rate of participation which was maintained until the mid 1920s.<sup>9</sup> This figure is lower than that observed for U.C.L., but significant given that it is an average based on all universities, some of which such as Oxford and Cambridge, were notoriously inegalitarian. In the provincial universities, it seems, women were present in much more equal numbers with men.<sup>10</sup> Little quantitative research has been undertaken regarding women's participation in individual universities. However studies which do exist suggest similar trends to those at U.C.L. Sheila Hamilton, writing about Edinburgh University stresses that the number of female students grew from around 250 in 1900 to 1,100 by 1930, and that the gap between numbers of male and female students narrowed. Although the female proportion of the total student body was roughly one third during the 1920s, lower than that at U.C.L., at an earlier date, 1900, women had constituted only one tenth of the total. Thus the number of women at Edinburgh, as at U.C.L. was increasingly catching up with the number of men. Hamilton also notes a feature common to U.C.L., namely that during and after the First World War, women came to dominate in the faculty of arts at Edinburgh, and that as barriers were dropped in other subject areas, women were keen to participate. In 1914 for example 106 women had been enrolled with the Special Medical School for Women, but once full university instruction in medicine was offered, this figure rose to 378 by 1918.<sup>11</sup>

Similarly at Aberdeen University, women had comprised a tiny percentage of all students, in 1895-6, 4.5 per cent. However by 1913, this figure had risen to thirty two per cent, and women accounted for half of the students in the faculty of arts. Their numbers in the faculty of medicine also doubled to 124 during the First World War.<sup>12</sup> The main reason for this

increase was that barriers to female admission were gradually being brought down, although women received far from equal treatment. They were not admitted to the faculty of law until 1918 for example, and were excluded from studying divinity.<sup>13</sup> This was the case in all British universities,<sup>14</sup> and may help to explain why U.C.L., which did not offer divinity as a degree, had a slightly higher proportion of female students than the average. Nevertheless, institutions such as those described, and U.C.L., are excellent examples of university colleges which offered high levels of female opportunity during the 1920s and show that a diminishing or stagnation of female educational participation was far from universal.

Not only was the proportion of female students at U.C.L. high, but the actual numbers of women at the college were rising after 1918. With the exception of the academic year 1923-24, the number of female students rose consistently every year. It cannot be argued that the rise in female participation at U.C.L. was a reflection of the increase in the female population of England and Wales. Although the number of women in the population did grow from 19,591,000 in 1918 to 20,729,000 in 1930, male figures also rose from 14,433,000 in 1918 (a figure which is based on the census returns, and only records civilians, explaining the rather low male population) to 19,072,000 by 1930. The female percentage of the total population was, in fact, consistent between 1921 and 1930 at just over fifty two per cent, thus the number of women in the population increased no more rapidly than the number of men.<sup>15</sup> This shows that as the 1920s progressed, seeking an education at U.C.L. was becoming more popular amongst women.

The fall in female participation in the academic year 1919-20 to 38.9 per cent seems at first glance quite drastic. However, the number of women at U.C.L. continued to rise in this year, in fact by 166 students, the single largest increase over the whole decade. The fall in the proportion of females was caused by a much faster growth of male enrolment in this



year, brought by the end of war, demobilisation and the return of large numbers of men to college. Although U.C.L. appears not to have offered its own scholarships to ex-servicemen, it did make certain concessions, easing their entry to the college. For example, men who had been in active service during the war were enabled to enter U.C.L. at an age older than that normally prescribed of eighteen.<sup>16</sup> Ex-servicemen, who were eligible for interim government grants to study at university were also allowed to defer payment of their college fees whilst waiting for their grants to arrive,<sup>17</sup> and men who had not been released from war service by September 1918 were allowed to begin their course of study in the second term, January 1919.<sup>18</sup> Whilst these policies were commendable, they had the effect of increasing the numerical presence of males in the immediate post-war years and giving the impression of a fall in the rate of female participation.

Other factors help to explain the overall increase in the number of students at U.C.L. and the growth in female involvement. Firstly, after 1920, state scholarships to university were available for the first time, which may have encouraged a number of young men and women, who previously were unable to afford a university education to enrol. Two hundred scholarship places were available, which were divided between the seven English examining bodies, proportional to the number of students who sat the school leaving examination. London fared well under this system gaining forty places in 1926, and forty two in 1928.<sup>19</sup> Nevertheless, the number of students who gained scholarships to study at U.C.L. must have been small, given the large number of London higher educational establishments in existence in the 1920s. In the period up to 1930, the policy of awarding scholarships to men and women on a strict fifty-fifty basis was in place,<sup>20</sup> which meant that opportunities for women were equally as good as for men, even if the total number of places was small. In addition, U.C.L. offered its own scholarships to young men and women who were contemplating entry to the college. Between 1918 and 1930, the number of scholarships

awarded rose from fourteen to thirty eight per annum, showing that increasingly, intelligent young people, who without financial assistance would have struggled to afford a higher education, were being offered the chance of doing so.<sup>21</sup> The rates were between £30 and £40 per year of study, which, given the high course fees at U.C.L., shown in Table 8.2 would only just have covered course costs without allowing any extra for maintenance. Nevertheless, college scholarships did account for a certain amount of increased participation at U.C.L., probably amongst people who previously struggled to afford a higher education.

The college calenders indicate that on average three or four scholarships were awarded in each subject area, per year, and were normally given on the basis of outstanding examination results.<sup>22</sup> From 1921 onwards, the college also began offering interest free loans and maintenance bursaries, which must have eased the financial burden of attending university for some.<sup>23</sup> Unfortunately this information was not broken down by sex, so it is not possible to comment on the effect that loans and bursaries had on female participation. In contrast the annual reports signify, that women were poorly represented amongst those receiving scholarship awards, as table 8.3 shows. Women were especially poorly represented in art, mathematics, science and engineering, and the only subject in which they fared better than men was in librarianship. The surprising dearth of women as recipients of art scholarships is explained by the fact that this scholarship was offered only to pupils in the drawing classes of University College day school who wished to proceed to U.C.L.,<sup>24</sup> and that this school was exclusively for boys throughout the nineteenth and twentieth centuries.<sup>25</sup> The poor level of scholarship funding for women was disproportionate to their participation in all subject areas at U.C.L. As table 8.1 shows, women made up over forty five per cent of students at U.C.L. on average, and given that they were much less likely to gain a

**Table 8.2 U.C.L. COMPOSITION FEES, 1918-1930. ( ALL FEES ARE FOR THREE SESSIONS\* (IN GUINEAS))**

Faculty	Course	1918-19	1919-20	1920-21	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30
Arts	BA (without science)	69		97				98					
	BA (with science)	74		105									
Science	BSc General	101		140									
	BSc Maths	-	-	-	-	-	-	103					
Economics	BSc Economics	36		63							78		
Architecture	BA Architecture	120		168		235*	228*						
Engineering	BSc Engineering	120		168									
Laws	LLB	36		54				72			78		
Medical Science	MB/BS	86		115									
Librarianship	Diploma in Librarianship	-	36	48								60	
Journalism	Diploma in Journalism	-	63	No Details	No Details	No Details	No Details	No Details	84				

\* Except BA architecture after 1922, when it changed from a three session to a five session course.

**Source:** College calendars, 1918-1930, U.C.L. Records Office,

scholarship to assist them than their male contemporaries, we can deduce that they struggled more to gain high levels of participation at the college than men.

**Table 8.3 ENTRANCE SCHOLARSHIPS AWARDED BY U.C.L., 1918-1930**

	<b>Total scholarships</b>	<b>Female scholarships</b>	<b>Female % of total scholarships</b>
Arts/Humanities	51	17	33.3
Classics	25	9	36.0
Art	11	0	0.0
Maths/Science	63	3	4.8
Engineering	37	0	0.0
Architecture	46	11	23.9
Laws	2*	1	50.0
Librarianship	14	9	64.3
Unspecified	<u>43</u>	<u>18</u>	<u>41.9</u>
<b>Total</b>	<b>292</b>	<b>68</b>	<b>23.3</b>

\* The small figure here is accounted for by the fact that law scholarships were not introduced until 1928.

**Source:** Annual reports 1916-1930, U.C.L. Records Office.

Another means of explaining the increase in female participation after the war is to consider internal changes which were occurring at U.C.L. In the academic year 1919-1920 for example, three new schools in the faculty of arts were founded; the schools of architecture, journalism and librarianship.<sup>26</sup> In addition, the same year saw an introduction of three new language courses, Danish, Norwegian and Swedish, in the department of general arts.<sup>27</sup> In 1922-23, a new five year degree in architecture was set up replacing the old three year degree,<sup>28</sup> and in 1924-25 a BSc in mathematics which was separate to the general science degree was launched.<sup>29</sup> All of these changes, along with an expansion of options available on other established courses, meant that increasingly U.C.L. was broadening its subject base and therefore attracting a wider range of students, but also expanding its potential capacity, so that physically it could accommodate more students than in the pre-war period. There is

little indication that U.C.L. dropped courses or subjects in this period, and therefore it appears that the new courses were not replacing old ones, but adding to them. The following discussion considers the range of these subject areas in which women participated.

### SCIENCE STUDENTS OF U.C.L.

The involvement of women in the sciences is central to this thesis, on the basis that the growing use of technology and greater links between science departments and industry in the 1920s,<sup>30</sup> meant that some of the most vocational courses were found within this faculty. Of course, many traditional subjects which had little industrial application remained popular. As Pollard has pointed out, the link between science and industry has frequently been exaggerated.<sup>31</sup> Nevertheless, women's participation levels in this faculty give some indication of their inclusion in subject areas which traditionally have been considered 'non feminine', and which may have offered greater opportunities than other courses for later economic activity. The results are presented in table 8.4.

A comparison of these figures and those in table 3.4 shows that the average percentage participation of women in science subjects had risen, from just over thirty per cent in the pre-war period to 35.6 per cent by the 1920s, an increase of just over five per cent. The actual numbers of women, in contrast, virtually doubled over the same period showing that in numerical terms U.C.L. was able to offer new opportunity to a larger population of women. This expansion can be explained largely by the increased range and number of subjects offered by U.C.L. in the 1920s. The growth in the proportion of women studying science and their average rate of participation, although reaching a significant 42.5 per cent between 1924 and 1925, did not account for the total rate of growth witnessed in table 8.1 and thus

we must look elsewhere to explain women's increased presence at U.C.L. Firstly the pattern of female participation in the faculty of science will be considered.

**Table 8.4 STUDENTS OF SCIENCE AT U.C.L. 1918-1930**

Year	Total no. of students	No. of female students	Female students % of total students
1918-19	165	44	26.7
1919-20	264	66	26.0
1920-21	403	123	30.5
1921-22	370	126	34.1
1922-23	351	131	37.3
1923-24	340	140	41.2
1924-25	367	156	42.5
1925-26	356	141	39.6
1926-27	335	136	40.6
1927-28	347	135	38.9
1928-29	311	116	37.3
1929-30	<u>357</u>	<u>119</u>	<u>33.3</u>
Average	330	119	35.6

**Source:** College calendars 1918-1930, U.C.L. Records Office.

The number of women studying science subjects rose consistently from forty four students in 1918-19 to 156 students by 1924-5. However after this it fell to 116 by 1928-9, only to make a small recovery to 119 by 1929-30. Although the number of women studying science fell after 1924-5, the decrease was small compared to the increase between 1918 and 1924, and the figure in 1930 was still well above that of 1918. The fall after 1925 is thus not of huge significance, especially given that by 1929-30 the trend was reversing. In spite of the reduction in their involvement in the faculty of science after 1925, women by 1930 accounted for exactly one third of all students, whilst in the middle of the decade they accounted for over forty per cent, a highly significant level of participation. Even though the proportion of women in science had not grown dramatically since the pre-war years, it had increased nonetheless, probably helped by the removal of the restrictions on women who studied in the

faculty of science before the First World War, which are outlined in table 3.3, and thus meant that women could participate in any science subject they desired. The opening of medical science to women in 1917 allowed females, who had long wished to study medicine but prior to the First World War had been excluded, to enrol. This must have affected the numbers and proportion of women studying science after 1917. The faculty of science is where those women who previously could not study medicine would most probably have participated, opting for human biology, pathology, or other subjects related to medicine. It is true that the availability of medical degrees to women through the University of London before the First World War, meant that some who were committed to studying medicine had been able to do so, but the opening of the faculty of medical sciences to women at U.C.L. in 1917 increased women's chances of gaining a place. On this basis it is quite remarkable that the number and proportion of women studying science increased at all. The following section shows that the faculty of medical sciences had initially high levels of female participation during the 1920s.

#### **MEDICAL STUDENTS OF U.C.L.**

The figures of students who studied in the faculty of medical sciences are presented in table 8.5. These cannot be compared with the pre-war situation, because, before 1917, women were not admitted to the faculty of medical sciences at U.C.L.. Therefore, the only comments that can be made relate to female participation in medicine during the 1920s. It is noteworthy that women participated at the rate of 39.7 per cent, in the academic year 1918-19, only one year after the faculty was made accessible, and that seventy seven women enrolled. This suggests that there was a good deal of pent up demand amongst women to study medicine. The fall in percentage share during the year 1919-20 was, like the diminished presence of women in the sciences, a result of increased male participation after

the ceasing of war and not a fall in female involvement. In fact the number of women increased to ninety during this session, and again to ninety eight during the year 1920-21. We can deduce from this that women were a significant presence in the faculty of medical sciences, especially given that this was such a new field of study for them. Traditional beliefs that medicine was not a suitable subject for women, and indeed that most women did not wish to engage in studying it, seem, on the basis of evidence for the years 1919-21 to have been unfounded.

**Table 8.5 STUDENTS OF MEDICAL SCIENCE AT U.C.L., 1918-1930**

Year	Total no. of students	No. of female students	Female students % of total students
1918-19	194	77	39.7
1919-20	281	90	32.0
1920-21	278	98	35.1
1921-22	254	79	31.1
1922-23	230	79	34.3
1923-24	217	50	23.0
1924-25	208	46	22.1
1925-26	211	48	22.7
1926-27	209	42	20.1
1927-28	212	38	17.9
1928-29	209	43	20.6
1929-30	<u>224</u>	<u>48</u>	<u>21.4</u>
Average	227	61	25.9

**Source:** College calendars 1918-1930, U.C.L. Records Office.

However, after 1921 the number of women in the faculty of medical science fell almost consistently to 1928. The male number also fell between 1921 and 1923 which explains why the female percentage held up. After 1923 though, the proportion of women studying medicine fell drastically from 34.3 per cent to twenty three per cent and by 1927-28 was as low as 17.9 per cent. This can in part be accounted for by an increase in male participation, but essentially by a large drop in the number of women between 1922 and 1924 from seventy



nine to fifty and then to a very small figure of thirty eight, half that of 1918-19, by 1927-28. After 1928, the number and proportion of women studying medicine began to pick up again.

The parallel fall in male and female participation between 1921 and 1923 can be explained to a degree by the fact that between 1920 and 1921 the cost of studying for a bachelor of medicine (MB) or bachelor of surgery (BS) degree increased from eighty six guineas for three sessions to 115 guineas for the same time period, as shown in table 8.2. It seems that the increase in fees for medical degrees was enough to discourage a number of people from studying. The decision to raise course fees across the college was stimulated by a conference of metropolitan medical school delegates who called for cost increases of thirty three per cent in all medical schools across London.<sup>32</sup> Following this, the budget sub-committee at U.C.L. met, and projected a £17,385 deficit for 1920-21 unless course fees were raised.<sup>33</sup>

The main cause of this financial crisis was that course fees had not increased since 1914,<sup>34</sup> and yet the cost of living had increased dramatically during the First World War. U.C.L. had only managed to keep its head above water by freezing the pay of staff earning over £800 per annum after 1914, and suspending all building programmes. Hence, by 1920, tensions were high, with a need, not only to increase staff salaries and proceed with building works, but also to award substantial bonuses or 'back pay' to staff who had not seen a salary increase in six years.<sup>35</sup> Finally, it was agreed that fees should be increased by thirty three per cent for medicine, forty per cent for arts, sciences and engineering and fifty per cent for individual or 'one off' courses of study.<sup>36</sup> It is hardly surprising then, that the number of men and women studying medical science fell after 1921. Tables 8.4, 8.6 and 8.7 also show a fall in the total number of students who took science, arts and engineering subjects after 1921. However, from 1924 the number of men in the faculty of medicine began to rise again, whilst female participation suffered another more serious drop.

The main cause of women's reduced participation after 1921 was not change in course cost, but an overt discrimination policy practised by University College Hospital (U.C.H.) Medical School. Although women had freely been admitted to the medical school since 1918, by 1920 there was growing resentment of their success by male medical students. The following extract from a letter to the Medical School Committee in 1920 is a good example of male feeling:

‘Many second and third year men are looking with alarm to a time when women will be admitted to house appointments. We need hardly point out, gentlemen, the intolerable position of an ex-serviceman who has, perhaps, as his house surgeon over him, a girl of twenty two.’<sup>37</sup>

The faculty of medical science at U.C.L. did not share this view, having in 1917 agreed that no limitations should be imposed on the number of women wishing to study in the department of anatomy.<sup>38</sup> However, this department only took students through their first two years of a medical degree. After this they could take either a general BSc or progress to U.C.H. Medical School to finish their medical training. The decision of the Medical School Committee to impose a quota on the number of women who could enter U.C.H. from the 1922-23 session onwards, showed their willingness to bow to male pressure, and also had an unfortunate effect on women's willingness to enrol, even as first year students in the department of anatomy where there were no official restrictions. Sadly the original medical school records have been mislaid, thus it was not possible to locate discussions which surrounded the decision to impose the quota, or to establish precisely why the action was taken. The quota acted as a severe disincentive against even beginning a medical training, given that most knew that they were unlikely successfully to complete their degrees. During the academic year 1920-21, twenty five women had secured places at U.C.H. medical school. These were allowed to proceed with their training, but thereafter, the medical school committee stated:

'That during the session 1922-23 and in subsequent sessions, the number of women students to be admitted to the hospital medical school be limited to twelve.'<sup>39</sup>

Here then, is an example of regression in female opportunity, after a promising period immediately after the First World War when women were admitted to the medical school without restriction. Given that their chances of receiving a full medical training after 1922 were so slight, women's involvement in the faculty of medical sciences was surprisingly high up to 1930, although way below its potential, as the figures from 1918-21 prove. The participation of women in engineering during the 1920s however, was not quite so dramatic.

### **ENGINEERING STUDENTS OF U.C.L.**

Like the faculty of medical sciences, engineering was closed to women before the war but was made available from 1918 onwards. Thus, no comparison can be made with the pre-war period. Engineering is of particular relevance to this thesis, because it was technical, and taught skills which could be applied to the needs of industry. The figures for students in the faculty of engineering are given in table 8.6 below.

Table 8.6 shows that the participation of women in engineering was tiny for the whole of the decade. There is little point in analysing trends when the numbers and proportions observed are so small, three students, and 2.2 per cent at their peak. Rather it is necessary to attempt an explanation of why women failed to be attracted to the faculty of engineering. From 1918 onwards electrical engineering was a listed course at U.C.L. showing that the college was keeping up with the industrial moves towards electrical appliance production and electrical engineering.<sup>40</sup> Female involvement in the electrical engineering industry increased from 16,800 employees in 1907 to 43,600 by 1924 and 60,500 by 1930, according to the third and fourth censuses of production in the UK,<sup>41</sup> although most of these women were production

line and assembly workers, not professional engineers. However, electrical engineering was the most promising field of engineering employment for women, and given that U.C.L. offered the option of studying this, it is perhaps surprising that so few enrolled. Alternatively, although at lower levels of the industry women's participation was growing, this does not mean that the path to becoming a professional electrical engineer was any easier for women than it was in other branches of engineering. Women were prevented by law from working night shifts, which made them inflexible, and therefore undesirable as employees in engineering works. The Women's Engineering Society did not win the battle to permit women to carry out shift work until 1934. Additionally, women who were apprenticed as engineers had to be supervised by another female. Not surprisingly, most firms were not willing to provide this level of special treatment.<sup>42</sup>

**Table 8.6 STUDENTS OF ENGINEERING AT U.C.L., 1918-1930**

Year	Total no. of students	No. of female students	Female students % of total students
1918-19	100	2	2.0
1919-20	133	2	1.5
1920-21	166	3	1.8
1921-22	166	3	1.8
1922-23	161	2	1.2
1923-24	120	2	1.7
1924-25	103	2	1.9
1925-26	104	2	1.9
1926-27	104	2	1.9
1927-28	102	1	1.0
1928-29	115	2	1.7
1929-30	<u>135</u>	<u>3</u>	<u>2.2</u>
Average	126	2	1.7

**Source:** College calendars 1918-1930, U.C.L. Records Office.

Within the college however, there is no indication that the faculty of engineering at U.C.L. was averse to admitting female students. In fact the faculty minute books for the 1920s give

details of four applications from women, Helen Grimshaw, Janet Harris, Ida Munro and Beatrice Beale, to study engineering. All were accepted into the faculty, and there is no evidence that women were consciously discriminated against.<sup>43</sup> However, the annual reports of the college for 1919-20 show that due to a serious accommodation shortage, nearly 100 engineering applications were turned down. In the academic year 1920-21 the same situation prevailed, the cause being huge oversubscription to the college from ex-servicemen on government grants, which meant that other potential students had to be turned away.<sup>44</sup> Although no evidence is available, it is possible that women were turned down in preference to men in periods of crisis, even though normal policy was not to exclude them. This however, must remain speculative.

Women do not seem to have been disadvantaged by the matriculation requirements which were necessary to study for an engineering degree. The recommendations given by the faculty of engineering to intending degree students were that out of the five subjects which had to be taken to matriculate, one should be in a science subject, and one in advanced mathematics.<sup>45</sup> A knowledge of engineering or mechanics was not necessary prior to degree study, and thus such subjects, which were not openly available to girls at school level, did not present obstacles to intending female engineers. A more notable feature is the tiny number of women who actually applied to be admitted to the faculty of engineering. This suggests that the main reason for a lack of female involvement was a low level of demand amongst women rather than college restrictions. The question must therefore be, whether engineering was a subject which simply did not appeal to women, or whether there were external professional restrictions which made practising engineering as a career difficult, and therefore diminished the attractiveness of such a degree.

The various engineering institutions, which by the 1920s were fairly prestigious and an important means of gaining full professional status, do not appear directly to have excluded women. However, Reader shows that the Institution of Electrical Engineers, which should have been of relevance to women, given that electrical engineering was one of their main areas of engineering work, did not actively encourage female membership. As late as the 1950s, he states, girls of school age were only just beginning to be targeted by the institution:

‘Among the members of whatever grade, women in the 1950s and 1960s remained very scarce indeed. In the 1950s, somewhat hesitantly, the Institution began addressing itself to schoolgirls as well as schoolboys.’<sup>46</sup>

He argues that the language used by the engineering profession as a whole was inherently masculine and probably deterred women from even attempting membership. As an example he quotes Professor Say who, in a 1965 careers booklet stated: ‘It is not really surprising that so many men feel drawn to the engineering career and are happy in it’.<sup>47</sup> Reader, in reply states: ‘The implication is that if a woman had felt drawn to electrical engineering, that would have been very surprising indeed’.<sup>48</sup> The fact that there was no official bar to women is shown by their small presence in the Institution of Civil Engineers in the 1920s. The first ‘lady’ associate member was Dorothy Buchanan in 1927. However as late as 1957, only five female names appeared on the role, highlighting the masculinity of the institution and of the whole profession.<sup>49</sup> It is not surprising that women lacked the courage or the willingness to study for a degree in engineering when it was so difficult to gain full professional status post graduation. The foundation of the Women’s Engineering Society in 1920, eased some of these pressures.<sup>50</sup> However, the society was not held in as high esteem as the institutions, and alone was probably not enough to raise the status of female engineers. Peggy Newton has shown that even by the 1980s, women comprised only 2.4 per cent of all technicians and 3.5 per cent of scientists and technologists within engineering.

The reasons for this deficiency, she claims, were that girls of seventeen considering a career in engineering felt they would face employer discrimination, and that they lacked basic mechanical experience which had not been encouraged for girls at school or in childhood.<sup>51</sup> If this was the case by the 1980s, it is hardly surprising that women were not attracted to engineering during the 1920s.

#### ARTS STUDENTS OF U.C.L.

Although arts subjects have traditionally been portrayed rather misleadingly as non-vocational, they are included in this study, because women participated in large numbers, and because the faculty was diverse and included a range of courses such as librarianship, journalism, architecture and languages to name a few which had distinct vocational applications.

**Table 8.7 STUDENTS OF ARTS AT U.C.L., 1918-1930**

Year	Total no. of students	No. of female students	Female students % of total students
1918-19	716	398	55.6
1919-20	1,055	526	49.8
1920-21	1,090	567	52.0
1921-22	1,121	626	55.8
1922-23	1,078	672	62.3
1923-24	1,053	658	62.5
1924-25	1,165	730	62.7
1925-26	1,175	745	63.4
1926-27	1,209	757	62.6
1927-28	1,253	781	62.3
1928-29	1,354	799	59.0
1929-30	<u>1,414</u>	<u>828</u>	<u>58.5</u>
<b>Average</b>	<u>1,140</u>	<u>674</u>	<u>58.8</u>

**Source:** College calendars 1918-1930, U.C.L. Records Office.

The number and proportion of women studying arts subjects at U.C.L. was very significant during the 1920s. With the exception of one year, 1923-24, female participation increased numerically right through the decade. The percentage of women studying arts subjects gives the best indication of this level of participation, showing that for eleven out of the twelve years covered, women comprised the majority of all students, rising to a peak in 1925-26 of 63.4 per cent. The only year in which women comprised a minority, a very marginal one of 49.8 per cent, was 1919-20. As we have seen in other faculties, this was a trend across the university, and can be explained by an unusually high number of men enrolling after having been released from military service. The expansion in the number of female and total students studying in the faculty of arts can be accounted for by the introduction of three new schools in 1919-20: architecture, librarianship and journalism. These, along with the departments of fine art and general arts combined to form the faculty of arts, and meant that an increasingly wide scope of subjects was offered to a larger population of students.

Although the extremely high involvement of women in the arts, is an excellent example that females were not as marginally represented as often suggested, it might also be considered disappointing, because the figures emphasise that the pattern of education had changed very little from the pre-war years, and that women were still attracted to non-vocational or 'ladylike' subjects. However a number of features of the faculty of arts at U.C.L. suggest that this was far from being the case. Firstly, an unusual aspect of courses within the faculty of arts was the inclusion of numerous science subjects; for example, botany, chemistry, geology, physics, zoology, mechanics, military science, mathematics and psychology.<sup>52</sup> The first five of these subjects were the same as those necessary to gain a BSc pass at U.C.L.. Students could opt for either the BA (with science) or the BA (without science). This suggests that relying on traditional definitions of 'arts' and 'science' does not necessarily provide us with a sound impression of the number of women who were studying science



subjects during the 1920s. It is conceivable that a large number of both men and women opted for the BA (with science) in preference to the general BSc, on the grounds that it was so much cheaper to enrol. Table 8.2 shows that the former cost seventy four guineas in 1918-19, increasing to 105 guineas in 1920-21, but that the fees for the latter were 101 guineas in 1918-19, rising to 140 guineas by 1920-21. Choosing the BA (with science) then, meant a saving of around twenty six per cent. Arts courses were cheaper than sciences in most British universities,<sup>53</sup> which helps to explain the national figures for more arts than science students during the 1920s.<sup>54</sup> The nature of the BA degree at U.C.L. demonstrates that a growth in the proportion of arts students nationwide may disguise a number of people whose primary interest was in scientific study.

In addition those who took the BA (without science) were not necessarily opting for classical subjects. Although courses in Latin, Roman history, Greek, Greek history, ancient history and Hebrew were offered, these were outnumbered by modern languages such as Dutch, French, Danish, Norwegian and Swedish, German, Italian and humanities such as geography, modern history and political economy.<sup>55</sup> Sanderson has stressed the importance of modern languages to the development of British industry and the economy in the 1920s.<sup>56</sup> The popularity of general arts (which encompassed these modern humanities subjects, and the science options), over courses in fine art, was significant. The average number of women who participated in general arts per annum was 341, whilst the average for fine arts was 239, between 1918 and 1930.<sup>57</sup> This strengthens the case that the motivation behind most female study was not dilettante, although the assumption that fine art could not be vocationally applied is misfounded, as the discussion on pages 122-23 explained. Finally, the proportional participation of women in the new schools of Journalism, Librarianship and Architecture was large, as table 8.8 demonstrates.

**Table 8.8 FEMALE PERCENTAGE OF TOTAL STUDENTS IN THE SCHOOLS OF JOURNALISM, LIBRARIANSHIP AND ARCHITECTURE AT U.C.L., 1919\*-1930**

	Journalism	Librarianship	Architecture
1919-20	7	51	9
1920-21	14	55	14
1921-22	58	64	16
1922-23	73	67	28
1923-24	71	69	25
1924-25	47	70	23
1925-26	45	71	23
1926-27	55	60	20
1927-28	67	64	17
1928-29	67	70	16
1929-30	<u>55</u>	<u>69</u>	<u>21</u>
Average	51	64	19

\* The figures commence in 1919, because this was the year in which these schools were founded.

**Source:** College calendars, 1919-1930, U.C.L. Records Office.

Librarianship in particular, had an impressive level of female involvement, averaging sixty four per cent across the decade. This subject held a distinctive attraction for women. Like teaching, it was a profession into which they were willingly accepted from the late nineteenth century onwards. Writing about the USA, Dee Garrison maintains that the profession of librarianship was deemed appropriate for women because great physical strength was not required and women were not subjected to dealing with 'rougher' members of society. Because librarianship was a rapidly growing field, plenty of jobs were available and the effects of female competition on male work prospects were not feared.<sup>58</sup> However, Webber points out that although women dominated numerically in library work in Britain, they rarely achieved senior positions.<sup>59</sup> In 1899 an attempt was made to exclude women from the Association of Assistant Librarians, but fortunately failed.<sup>60</sup> Nevertheless it remains a good example of male hostility against women rising to supervisory positions and threatening their

dominance. In addition, when women did gain managerial positions, they were paid less than their male colleagues. An advertisement for a librarian at Winchester public library in 1921 offered a salary of £250 for a new librarian, or £200 if the person appointed was a woman.<sup>61</sup> Another unfortunate woman who wished to apply for a job as an assistant librarian in 1920 thought it wise to enquire whether the post was open to female applications. The reply was as follows:

‘There is no disqualification as to sex... The staff of the department however, is entirely of men and lads, and I hardly think the committee would place a woman in command in present circumstances.’<sup>62</sup>

The reply was therefore something of a paradox. Quite clearly sex discrimination was operating in this library although it was not overtly admitted. In spite of such restrictions however, librarianship was one profession in which it was possible for women to rise to the top. Although they had to struggle to do so, and faced numerous inequalities once in the job, librarianship offered better prospects for women than most other professions in the 1920s. This helps to explain the high levels of female involvement in librarianship courses at U.C.L., and is a further indication that women were keen to study subjects which were career orientated.

The participation of women in journalism at U.C.L. was large, comprising just over fifty per cent of all students on average. Given the traditional image of journalism as a male domain, such a level of participation appears surprising, and yet the reality was that journalism was a growing field of employment for women. Harvey shows that women were becoming involved in university newspapers as journalists and editors during the First World War, in the absence of male graduates who previously had organised these papers. Only at Oxford and Cambridge did newspapers close down when men were enlisted, in preference to handing the task over to women.<sup>63</sup> The U.C.L. Union Magazine, renamed University College

Magazine in 1920 did not go out of print during the years of war. It seems to have remained functional however, by a regular replacement of male editors with other men rather than women.

Before the First World War, women were already present on the editorial board. One woman, Dona Torr, who was to become an influential marxist historian and member of the Communist Party of Great Britain,<sup>64</sup> sat on the committee with eight others, including the editor and manager who were all male in 1911.<sup>65</sup> This situation prevailed until 1917, suggesting that the war did little to increase female participation. However, in December 1917 two women were made sub-editors, although the editor was still male.<sup>66</sup> More significant changes occurred after the war when in March 1921 there were two female sub-editors, and a female manager, Edith Peach.<sup>67</sup> This is important, because it shows that women did not simply lose their new positions when men returned from war. From 1921 onwards women accounted for at least half of the board members, and in March 1923, Marjorie C Poole was the first woman to be made editor of the magazine, with a female sub-editor, assistant manager and honorary secretary working under her.<sup>68</sup> Within the college, opportunities for women who were interested in journalism were therefore increasing. After the war, British women were given permission to hold permanent parliamentary gallery tickets for the first time, beginning a trend of the female parliamentary correspondent. According to a pamphlet, celebrating fifty years of the press in 1948, the first woman appointed to this position was Miss E A Bayliss, although no date is given.<sup>69</sup>

So a number of changes occurred which meant that women were increasingly attracted to journalism. A contributing factor was the growth of 'women's features' in the new popular press, introduced from 1896 onwards.<sup>70</sup> The Daily Mail for example, carried a feature entitled 'Woman's Realm' from 1896, and a number of women's magazines such as Home

Chat which ran until 1959 and also political papers such as Woman and the Women's Dreadnought which was founded in 1913, and edited by Sylvia Pankhurst emerged.<sup>71</sup> A number of reviews, around the turn of the century, argued that women's participation was increasing rapidly in the field of journalism. The new press aimed at a female audience, and mainstream newspapers, were quite prepared, even in the late nineteenth century to employ female writers. The Girl's Realm in 1890 stated:

'Scarcely a paper is to be found today which has not one or two women on its staff, either as editor, sub-editor, leader writer, special correspondent, reporter or critic'.<sup>72</sup>

A good example of a woman who succeeded in pioneering the area of cookery and domestic journalism was Elizabeth Craig, highly respected and widely sought after by a number of newspapers and magazines in the 1920s and 30s.<sup>73</sup> In addition, there was a growth in female editorship. Time and Tide, a radical weekly paper was introduced, edited and chaired by Viscountess Rhondda in the 1920s. It was staffed exclusively by female journalists, and reported on political, topical and often non-establishment issues.<sup>74</sup> Female journalists, and newspapers then, reported on more than so-called 'women's issues'. Similarly, the paper Foreign Affairs was edited by Helena Swanwick during the 1920s.<sup>75</sup> However, in 1936, Mr Tom Clarke in an address to the Institute of Journalists stated:

'Feminist though I am, with belief in the growing opportunities for women in journalism, I think the balance of the sexes in the journalism course at the University of London requires some adjustment. The proportion of women is too high and out of relation to their chances in employment.'<sup>76</sup>

Thus, it is argued, the participation of women in journalism courses at U.C.L. was unrealistic. However, Clarke did not allow for the fact that although still difficult to enter, journalism offered far more opportunity to women than other professions. The ability to freelance was popular amongst many women because they were not obliged to compete in a male dominated office environment. In fact, women had been successful as freelancers

since the nineteenth century, with notable examples such as Eliza Lynn Linton and Flora Shaw,<sup>77</sup> and, according to contemporary reviews, a host of less eminent others.<sup>78</sup> During the twentieth century, women also gained acclaim as journalists. Vera Brittain was freelancing during the 1920s writing for papers and magazines such as the Manchester Guardian, Time and Tide and the Outlook. Far from writing solely for a female audience, she wrote on topical and political issues, which appealed to a male as well as a female readership.<sup>79</sup> Rebecca West was a prolific writer and novelist. In 1911 she was a reviewer for Freewoman and by 1912 was a political writer for the Clarion and many other newspapers. She was awarded a CBE in 1949 and a DBE in 1959 and gained two honorary DLitts in 1965 and 1980 as a result of her prestigious career.<sup>80</sup> Ellen Wilkinson, the first female Labour MP in 1924, was also renowned as a 'hard hitting' and prolific writer during the 1920s and 1930s. She wrote for numerous newspapers, the Express, Herald and Clarion, to name a few, and her articles were almost entirely political in nature. She was one of the first correspondents to get a report through from Germany in 1936, stating that Hitler's troops had marched into the Rheinland.<sup>81</sup> Women not only freelanced, a number also gained places on the regular office staff of newspapers.<sup>82</sup> As such, their starting wage was in the region of £50-£100 per annum in the 1890s, but even at this early date, if successful, their earnings could rise to £200-£400.<sup>83</sup> The attractiveness of journalism to women, even if they overestimated their chances of employment, is thus easy to understand. It remains fascinating however, that women actually outnumbered men as journalism students at U.C.L. when the trade itself, despite the developments of the 1920s was still male dominated.

Women's participation in the school of architecture, although much smaller than in librarianship or journalism, was significant. Table 8.8 shows that women comprised around one fifth of all students in this school. There are no figures for participation in architecture before 1913, so it is difficult to establish whether women's position had changed very much.

However, at the polytechnic at Regent Street before the First World War, a tiny percentage of women, 2.2 per cent, studied architecture. In addition, as late as 1922, the Royal Institute of British Architects had only five female members, largely because architecture was still perceived to be too connected to the building industry for it to be a respectable occupation for 'young ladies'.<sup>84</sup> On this basis, the degree of female involvement in the school of architecture at U.C.L. during the 1920s was impressive, and supports the contention that women opted where possible for vocational studies, often breaking the boundaries of what was deemed 'appropriate'.

The only remaining area of student activity was the faculty of laws. Although this subject was neither scientific, nor technical, most students who studied it did so to improve their chances of entering the legal profession. Thus this subject is of interest on the grounds that it was essentially vocational. The findings are presented in table 8.9.

**Table 8.9 STUDENTS OF LAW AT U.C.L., 1918-1930**

<b>Year</b>	<b>Total no. of students</b>	<b>No. of female students</b>	<b>Female students % of total students</b>
1918-19	18	1	5.3
1919-20	36	4	11.1
1920-21	39	5	12.8
1921-22	38	6	15.8
1922-23	44	4	9.1
1923-24	42	7	19.0
1924-25	68	7	10.3
1925-26	65	6	9.2
1926-27	81	7	8.6
1927-28	90	12	13.3
1928-29	89	10	11.2
1929-30	<u>90</u>	<u>11</u>	<u>12.2</u>
<b>Average</b>	<b>58</b>	<b>7</b>	<b>11.5</b>

**Source:** College calendars 1918-1930, U.C.L. Records Office

There is little point in analysing trends of female participation in law subjects, because the numbers and proportions observed are relatively small. However, it is noticeable that the participation of women did increase on average during the period, although not consistently, from one student in 1918 to eleven by 1930. The most useful approach is to establish why female involvement, although reaching nineteen per cent at its peak in 1923-24, was generally so slight. It could be argued that women were not particularly attracted to practising law. However, given their apparent willingness to be included in other professions such as medicine, journalism, architecture and librarianship, this is improbable. More plausible is the possibility that restrictions were still operating either externally or internally which discouraged women from studying. The degree in law (LLB) was, in 1918, one of the cheapest courses of study at U.C.L., at thirty six guineas for three sessions. However, a number of significant price rises in 1920, 1924 and 1927 brought the cost of the degree up to seventy eight guineas, as demonstrated in table 8.2. Although still one of the cheaper courses of study at the college, the degree in law rose proportionately more in cost, and also had more fee changes than any other course of study at the university. This may have deterred a number of prospective law students, although there was no apparent fall in numbers after each successive price change. In addition, the cost of attending U.C.L. was not all that was involved in training to be a lawyer, the post-graduate training was also expensive, which may have encouraged a number of women to study different subjects which would lead to less costly careers. There is no indication that the Faculty of Laws made any specific restrictions regarding female students. In fact, gender issues were not discussed throughout the whole decade of the 1920s, although the faculty did make its policy on open access clear in 1925, when after a discussion on entry requirements it resolved: 'no barriers as to the admission of students were brought forward'.<sup>85</sup>



It appears therefore, that women chose not to study law in large numbers, rather than being restricted from doing so. However obstacles were not only faced in the college environment and the climate of the external labour market should be taken into consideration before assuming that women simply preferred not to study law. Little research has been carried out on the position of women in the legal profession in the interwar years. Spencer and Podmore, however, show that as late as 1957, only two to three per cent of practising lawyers were female, and by 1987 this figure had risen only to twelve per cent. This dearth of female lawyers seems to have resulted largely from discrimination rather than choice, given that forty per cent of the university student population were women in 1987.<sup>86</sup> Employers in the 1980s, believed that lawyers should be aggressive and competitive, not qualities that were deemed 'feminine'. Women were perceived to be 'sensitive' by nature, and thus they would find it difficult to act professionally.<sup>87</sup> This masculine definition of professional conduct shows that as late as the 1980s women were still struggling to prove their worth in a profession where male attitudes and values predominated. An article in 1958 also drew attention to the lack of opportunity for women wishing to train as barristers:

'There is still almost overwhelming prejudice against women both at the Bar itself, and among solicitors and among the public. In consequence, it is extremely difficult for a woman to find a vacancy in chambers.'<sup>88</sup>

David Sugarman contends that the late nineteenth and early twentieth century legal profession was highly androcentric, for example suggesting that there were links between the Masonic Order and the law societies:

'The legal profession constructed and sustained a culture supportive of male exclusiveness. The Inns of Court and the law societies were masculine sanctuaries whose rituals, rhetoric, discipline, sense of social hierarchy and secrecy marginalised women.'<sup>89</sup>

Barbara Broadbent also shows that although the number of female lay magistrates was rising during the interwar period, after the Sex Disqualification (Removal) Act of 1919 allowed the

first woman, Ada Summers, to take her place on the bench, the number of female stipendiary judges was marginal. As late as 1990, only four per cent of professional judges were female, whilst 43.9 per cent were lay magistrates. This, she argues, was largely because of male arguments that women were too weak to be successful judges, and frequently became emotionally involved in their cases. She stresses that no evidence was given to support this contention. Whilst women were seen to be suited to philanthropic duties such as taking on the role of Justice of the Peace, their suitability to becoming full professionals and competing with men was contested.<sup>90</sup> It is hardly surprising then, that during the 1920s women were reluctant to study law at U.C.L., and that they comprised, on average, over eleven per cent of all students is rather impressive. In addition, although the Sex Disqualification Removal Act allowed women to enter the Bar and the Law Society after 1918 the first woman was not called to the bar until 1921<sup>91</sup> and the first female solicitor was not appointed until 1922.<sup>92</sup> Thus the 1920s was a decade of slow progress and tentative attempts by women to enter a legal profession in which it was still much more difficult to succeed, especially if one sought remunerative employment, than in alternative professions such as teaching and librarianship.

In spite of a relatively low rate of female participation in the faculties of engineering and laws, other faculties accounted for large numbers of female students during the 1920s, especially arts, science and medical sciences and the schools of journalism and librarianship. The overwhelming impression is that, with one or two exceptions, women at U.C.L. were well represented in nearly all subject areas, and were not disproportionately predominant in courses which were dilettante or non-vocational. The following section considers whether this level of participation was similar amongst the graduates of U.C.L., and if so, in which subjects women most commonly graduated.

## GRADUATES OF U.C.L.

The graduate information in the annual reports was much more detailed than that in the calendars of the pre-First World War period. Not only was a breakdown given by type of degree, for example: BA, BSc, LLB, BSc Engineering, but also by the subject that was read to gain that qualification. Under the BA degree, for example, were graduates in architecture, French, English, geography, mathematics and history to name but a few. BSc graduates had studied a range of subjects such as botany, chemistry, physics and psychology. In addition there was a 'general' BSc, which did not require subject specialisation, and after 1926 a 'special' BSc was introduced in addition to the existing science degrees. 'Special' degrees were set and marked entirely by U.C.L. professors, after complaints that the existing BSc examinations, regulated by the University of London, were too rigid and centralised, and did not allow U.C.L. lecturers to elaborate on their own areas of interest.<sup>93</sup>

In spite of the apparent distinction between science and arts degrees, there was an element of overlap. Students could graduate in mathematics, geography and psychology with either a BA or a BSc for example. This highlights that a straightforward classification by science and arts graduates is problematic, and will not give a reliable impression of the nature of degrees studied by U.C.L. students. On this basis, the most useful starting point is to consider the total number of graduates at U.C.L., in all subject areas between 1918 and 1930, rather than attempting to look at specific disciplines. Table 8.10 gives this information, and includes figures for BA, BSc, LLB and BSc Engineering graduates. Figures for medical graduates were not provided in the annual reports, presumably because the majority of training was carried out at University College Hospital. This is not problematic, because we know from an earlier discussion that the number of women attending the medical school each year was limited to twelve.

**Table 8.10 GRADUATES OF U.C.L., 1918-1930**

	<b>Total graduates</b>	<b>Female graduates</b>	<b>Female % of graduates</b>
1918	58	40	69.0
1919	51	30	58.8
1920	84	27	32.1
1921	130	30	23.1
1922	188	51	27.1
1923	220	79	35.9
1924	179	73	40.8
1925	215	90	41.9
1926	216	86	39.8
1927	248	118	47.5
1928	246	107	43.5
1929	199	79	39.7
1930	<u>239</u>	<u>102</u>	<u>42.7</u>
Average	175	70	40.0

**Source:** Annual reports 1919-1931, U.C.L. Records Office.

In 1918 and 1919, the proportion of women obtaining degrees at U.C.L. was very high, far outweighing the numbers of male graduates. This is not especially surprising, given that male demobilisation after the war, and reinstatement into employment, education and other areas of public life was only just beginning. The figures indicate however, that during eras of increased opportunity such as the First World War, women demonstrated a willingness to participate and succeed. Between 1920 and 1921, the proportion of women gaining degrees plummeted, and in addition, their numbers declined from thirty to twenty seven. Such figures are not unexpected, given that ex-servicemen were being reabsorbed into society in significant numbers, and that the government was keen to promote opportunities for ex-soldiers, at the expense of women if necessary, to retain social harmony, and avoid a spiralling crime rate.<sup>94</sup> It seems, in the case of U.C.L., that male enrolment after 1920, not only accounted for a decline in the share of degrees held by women, but also displaced a number of potential female graduates. The years 1918-1921 are therefore rather unusual, and the period 1922-1930 is much more representative of a 'normal' climate at U.C.L.

After 1921 the number and proportion of women gaining degrees began to increase again, reaching a peak of 118 in 1927 and 47.5 per cent of the total, virtually half of all graduates. Even if the years 1918-1921 are included, women comprised forty per cent of graduates on average across the period, a highly significant level of participation. The number of degrees obtained by both men and women increased after 1921 with the exception of a drop in 1924 and then a more significant fall between 1928 and 1929. However by 1930, the figures were increasing again and the proportion of female graduates had risen to 42.7 per cent, suggesting that the fall was not indicative of a trend. It is noticeable that the decline in numbers of graduates coincided with the 'Great Depression' of 1929, and it may have been that a number of families whose offspring were studying at U.C.L. were forced, through economic necessity, to cease funding their sons and daughters before they gained their degrees, although one would not expect the depression to have affected figures until 1930.

An outstanding feature of the figures for female graduates in the 1920s is how high they were in comparison to the pre-war period. Table 3.5 showed that the highest number of female graduates, between 1910 and 1913, was twenty three. After 1918, the lowest figure was twenty seven in 1920, but by 1928 the number of female graduates had risen to 107. More importantly, women were beginning to graduate in proportionately larger terms than prior to the war. Between 1880 and 1913 they had averaged around thirty four per cent of all graduates, but between 1918 and 1930 this had risen to forty per cent. Not only were female numbers increasing, but their ability to compete with men was growing. The rise in the number of female graduates after 1918 should be qualified. Prior to 1914, figures for engineering and law graduates were not included, because both faculties were closed to women whereas after 1918 this was no longer the case. However, between 1919 and 1930, 261 engineering graduates were registered, of whom only three were women!<sup>95</sup> The inclusion of these figures, if anything, serves to undermine the proportional participation of

women as U.C.L. graduates, and certainly not to inflate the figures. If the engineering graduates are removed from table 8.10, the result is that women comprised virtually forty five per cent of total graduates on average. This is probably a fair exercise, given that trade restrictions against women who wished to practice engineering were so great that gaining an engineering degree was virtually worthless.

It appears that the growth of female graduates was accounted for, largely by increases in the areas of science and arts. Table 8.11 shows the number and proportion of science graduates, excluding engineering graduates, who were female.

**Table 8.11 SCIENCE GRADUATES OF U.C.L., 1918-1930**

	<b>Total graduates</b>	<b>Female graduates</b>	<b>Female % of total graduates</b>
1918	13	7	53.8
1919	18	11	61.1
1920	35	4	11.4
1921	51	7	13.7
1922	75	17	22.7
1923	66	24	36.4
1924	79	30	38.0
1925	89	33	37.0
1926	94	29	30.8
1927	95	37	38.9
1928	98	41	41.8
1929	79	27	34.2
1930	<u>83</u>	<u>24</u>	<u>28.9</u>
<b>Average</b>	67	22	32.8

**Source:** Annual reports 1919-1931, U.C.L. Records Office.

The trend of female participation as science graduates between 1918 and 1921 was very similar to that of women graduates in general, although the return of male students in 1920 affected them more significantly, with the number of women falling from eleven to four and

their proportion of all graduates declining to 11.4 per cent. However, after this, a steady increase took place, with a peak of forty one female graduates by 1928 who comprised nearly forty two per cent of the total. Although women did not comprise so large a proportion of science graduates as they did graduates in general, significant strides were being made. On average, between 1880 and 1913, women had accounted for just under twenty seven per cent of science degrees awarded, as demonstrated in table 3.5, no mean feat in a period where a number of scientific courses were still closed to them. However, between 1918 and 1930 women constituted nearly thirty three per cent of total science graduates, a six percentage point increase on the pre-war period. The main reason for this increase was the opening of previously closed courses such as physical geography and mineralogy, applied statistics and physical anthropology which enabled women to participate in any science option they chose, without official restriction. This indicates that once barriers were brought down, women were keen to study, and proved their ability to gain high level qualifications. In addition, a broadening of opportunities in new, light scientific industries of the 1920s meant that the job market for scientifically trained women improved, and must have encouraged some women seriously to consider science as a practical option.<sup>96</sup>

A consideration of women who were awarded BSc degrees does not give an altogether complete impression of female success as science graduates. For example, a degree in mathematics could be achieved through the route of BA or BSc. On aggregate women were proportionately much more significant on the BA than the BSc programme. Out of twenty five BA graduates, twelve, or forty eight per cent were women. In contrast out of seventy two BSc graduates, twenty two, or thirty one per cent were female. Women's higher proportional significance on the BA mathematics is important, but is not expressed by the college's own classification of 'science' and 'arts'. This should be taken into account when considering a lower number of female science than arts graduates. Similarly, although a high

proportion of women, over sixty one per cent of the total<sup>97</sup> were awarded arts degrees between 1918 and 1930, this does not indicate that their motivation was non-vocational. Table 8.12 shows the low popularity of subjects such as Hebrew, Greek, classics and philosophy amongst female graduates as opposed to the popularity of humanities, social sciences and modern languages such as English, French, history and geography. Although neither technical nor practical, such courses may well have offered more hope of later employment opportunities than classical subjects.

**Table 8.12 SUBJECTS LEADING TO BA DEGREES, AND AGGREGATE NUMBER OF WOMEN GRADUATING IN EACH SUBJECT, 1918-1930.\***

Course	No. of female graduates	
English	179	
French	137	
History	128	
Geography	49	1st figures appear in 1922.
BA Pass	25	
Latin	22	1st figures appear in 1920.
German	17	
Mathematics	12	
Architecture/Archaeology	8	
Classics }	6	
Philosophy }	6	1st figures appear in 1919.
Psychology	5	1st figures appear in 1925.
Greek	1	1st figures appear in 1923.
Dutch	0	1st figures appear in 1928.
Spanish	0	1st figures appear in 1928.
Hebrew/Aramaic	0	1st figures appear in 1922.

\* Figures are for the period beginning 1918 unless otherwise stated.

**Source:** Annual reports, 1918-1931, U.C.L. Records Office.

Table 3.6 showed that before the First World War, graduates accounted for only just over eleven per cent of the total student body, a small proportion. Table 8.13 considers whether



the situation had changed between 1918 and 1930. It is reasonable to assume that each student of the college would have studied for at least three years in order to gain a degree, thus the total number of students at U.C.L. between 1918 and 1930 has been divided by three. In addition to the need to calculate three students for every graduate, it is necessary to remember that medical figures are included in the 'student' but not the 'graduate' data, and that a number of diplomas were offered by U.C.L. during the 1920s. Students gaining such qualifications would not have been classed as 'graduates'.

**Table 8.13 STUDENTS AND GRADUATES OF U.C.L., 1918-1930**

	<b>Total students (÷ 3)</b>	<b>Total graduates</b>	<b>Graduate % of total students</b>
1918-19	398	58	14.6
1919-20	590	51	8.6
1920-21	659	84	12.7
1921-22	650	130	20.0
1922-23	621	188	30.3
1923-24	591	220	37.2
1924-25	637	179	28.1
1925-26	637	215	33.7
1926-27	646	216	33.4
1927-28	667	248	37.2
1928-29	693	246	35.5
1929-30	<u>740</u>	<u>199</u>	<u>26.9</u>
<b>Average</b>	<b>627</b>	<b>169</b>	<b>26.9</b>

**Source:** College calendars 1918-1930 and Annual reports 1919-1931, U.C.L. Records Office

Examples of awards which did not lead to graduation were the academic diploma in geography, the certificate in architecture, the certificate and diploma in town planning, the diploma in civic architecture and engineering, and the diplomas in librarianship and journalism.<sup>98</sup> Because students are described only by the faculty in which they studied in the college calendars and not by specific courses, it is not possible to establish the number

of students who obtained certificates and diplomas in the faculty of science, or in the schools of architecture and engineering which also contained degree students. However, in the schools of librarianship and journalism, diplomas were the only awards given, hence the number of students enrolled for these qualifications can be calculated. Between 1918 and 1930 there were 1,521 students in these two schools which shows that a vast number of students who did not 'graduate' did not fail their courses. On this basis, a graduation rate of virtually twenty seven per cent on average was significant. Table 8.13 certainly indicates that degrees were becoming a much more important part of U.C.L.'s curriculum in the 1920s, than had been the case before the war.

According to Bellot this was because by the 1920s, U.C.L. was a school of the University of London, and thus an integral part, with increasing prestige in comparison to the small influence it exercised prior to the First World War.<sup>99</sup> Students now had to study full-time at a recognised school if they were to be awarded an 'internal' University of London degree. In addition from 1926, U.C.L. won the right to set and mark its own specialist science papers based on the expertise of its professors, which led to a BSc 'special' degree awarded by the University of London.<sup>100</sup> The figures in Table 8.13 signify the importance of this new independence by a growth in the number of graduates after 1927. Students could now study for the standard honours degree in science, or the 'special' U.C.L. science degree. This flexibility seems to have increased graduate figures. Table 8.14 shows the proportion of women who gained degrees, based on the figures for female students of U.C.L. (divided by three).

**Table 8.14 FEMALE STUDENTS AND FEMALE GRADUATES OF U.C.L., 1918-1930**

	<b>Female students (<math>\div 3</math>)</b>	<b>Female graduates</b>	<b>Graduate % of total students</b>
1918-19	174	40	23.0
1919-20	229	30	13.1
1920-21	265	27	10.2
1921-22	280	30	10.7
1922-23	296	51	17.2
1923-24	286	79	27.6
1924-25	314	73	23.2
1925-26	314	90	28.7
1926-27	315	86	27.3
1927-28	322	118	36.6
1928-29	323	107	33.1
1929-30	<u>336</u>	<u>79</u>	<u>23.5</u>
<b>Average</b>	287	67	23.3

**Source:** College calendars 1918-1930 and Annual reports, 1919-1931, U.C.L. Records Office.

Once the return of demobilised soldiers had taken place by about 1922, the rate of female graduation began to increase. After 1927 further growth occurred as over thirty six per cent of women graduated. In fact table 8.11 showed that in 1927 and 1928 women's participation as science graduates rose far more than men's. This is interesting given that the appeal of science degrees to women is generally believed to have been negligible.

The proportion of female students who graduated was slightly lower on average than the figures for total students seen in Table 8.13, although not significantly so. In addition the information we have regarding the aggregate number of librarianship and journalism diploma students, from 1918-1930, shows 596 men but 924 women enrolled. This suggests that women do not fare well in a comparison of 'students' and 'graduates'. However in a number of courses which we know little about, such as the diplomas in architecture and town planning, men were probably in the majority. On the information available however, the

suggestion is that women as a proportion of their own gender group, were just as likely as their male contemporaries to embark on degrees and succeed in graduating.

Indeed this has been the overwhelming finding of the study of U.C.L. between 1918 and 1930. At all levels, whether as students or graduates women participated in large numbers and proportionately increased their share of the total compared to the pre-war figures. The fact that women dominated in some fields, for example as arts graduates, has rarely been commented on. It remains to be seen in the following chapter whether the polytechnic at Regent Street witnessed similar trends of female involvement. In a few areas, namely as engineering graduates, women's participation was marginal. Although an element of choice or preference may have contributed to these small numbers, the fact that women only accounted for one per cent of the total suggests that restriction was the main cause of low involvement, given that in other professional courses women showed willingness to participate. Where access was open and opportunities to gain employment after graduation seemed good, women showed desire and determination to succeed.

## NOTES TO CHAPTER EIGHT

1. H H Bellot (1929), p. 372.
2. Ibid, pp. 406-8.
3. Ibid, p. 411.
4. H Billett (1990), p. 173.
5. H H Bellot, op.cit, p. 400.
6. Ibid, p. 401; N Harte and J North (1978), p. 132.
7. H H Bellot, op.cit, p. 356 and p. 386.
8. College calendar, 1913-14, p. 598, U.C.L. Records Office.
9. A H Halsey (1972), p. 203.; U.G.C., 3/6, pp. 8-9, Returns from Universities and University Colleges in Receipt of Treasury Grants (1924-25), P.R.O.
10. E S Eschbach (1993), p. 171; A H Halsey, op.cit, p. 205.
11. S Hamilton (1983), pp. 112-3.
12. L Moore (1991), pp. 43-4.
13. Ibid, p. 44.
14. E S Eschbach, op.cit, p. 173.
15. B R Mitchell and P Deane (1962), p. 10.
16. College calendar, 1918-19, p. 5, U.C.L. Records Office.
17. Minutes of college committee, November 1918-July 1919, p. 116, no. 121, U.C.L. Records Office.
18. Ibid, p. 17, no. 45H.
19. ED 72/4, See especially letters dated 14 May 1925, 17 February 1926 and 27 January 1928, P.R.O.
20. Ibid, for explanations of the decision to postpone the equal awarding of scholarships to men and women see letters dated 20 July, 6 August 1921 and 7 August 1930.
21. Annual reports, 1916-30, entry each year under the heading 'Entrance Scholarships Awarded', U.C.L. Records Office.
22. College calendar, 1919-20, pp. 5-13, U.C.L. Records Office.
23. Annual reports, 1921-30, entry each year under the heading 'Grants and Loans to Students', U.C.L. Records Office.
24. College calendar, 1919-20, p. 6, U.C.L. Records Office.

25. H J K Usher (et al), (1981); no references to girls are made throughout the book.
26. College calendar, 1920-21, under the heading 'Students of the College', U.C.L., Records Office.
27. Ibid, 1919-20, p. 15.
28. Ibid, 1922-23, pp. 121-2.
29. Ibid, 1924-25, p. 22.
30. M Sanderson (1972), pp. 251-8.
31. S Pollard (1989), p. 122.
32. Minutes of college committee, 1919-20, p. 62, no. 176, U.C.L. Records Office.
33. Ibid, p. 77, appendix 1.
34. For an example of this, compare: college calendar, 1913-14, p. 25 with college calendar, 1918-19, pp. 20-1, U.C.L. Records Office.
35. Minutes of college committee, 1919-20, p. 77, pp. 2-3 of appendix 1, U.C.L. Records Office.
36. Ibid, appendix 2.
37. Quoted in W R Merrington (1976), pp. 238-9.
38. Faculty of medical sciences minute book, Vol. 1, 1906-1921, p. 115, U.C.L. Records Office.
39. Ibid, p. 184; also printed in Minutes of college committee, 1920-1921, p. 44, no. 108.
40. College calendar, 1918-19, pp. 131-3, U.C.L. Records Office.
41. Third Census of Production in the UK (1924), and Fourth Census of Production in the UK (1930).
42. M Sanderson, op.cit, p. 322 and p. 336.
43. Faculty of engineering minute book, Vol. 2, 1919-1927, p. 60, p. 68, p. 140, and Faculty of engineering minute book, Vol. 3, 1927-1938, p. 10, U.C.L. Records Office.
44. Annual report, Volume VI, 1916-1920, see especially academic years 1919-20, p. 46, and 1920-21, p. 42, U.C.L. Records Office.
45. College calendar, 1919-20, p. 135 and p. 143, U.C.L. Records Office.
46. W J Reader (1987), p. 160.
47. M G Say, quoted in W J Reader, op.cit, p. 160.
48. W J Reader, op.cit, p. 160.

49. G Watson (1988), pp. 129-30.
50. See for example: College calendar 1918-19, pp. 14-6, U.C.L. Records Office.
51. P Newton (1987), pp. 185-86.
52. See for example: College calendar 1917-18, pp. 14-5, U.C.L. Records Office.
53. C Dyhouse (1995), p. 28.
54. M Sanderson (1972), p. 263.
55. College calendar, 1919-20, pp. 14-5, U.C.L. Records Office.
56. M Sanderson, op.cit., p. 266.
57. See college calendars, 1918-1930, U.C.L. Records Office.
58. D Garrison (1975), p. 31.
59. N Webber (1984), p. 153.
60. M J Ramsden (1973), p. 4.
61. K Keibel, K Heim and D Ellsworth (1979), p. 83.
62. Ibid, p. 81.
63. A D Harvey (1991) 'Jaw, jaw about the war, war'. Article published in The Times Higher, 4 October.
64. J Saville (1954), foreword to a volume of essays in honour of Dona Torr, pp. 7-8.
65. U.C.L. Union Magazine, Vol. 5, No. 3, Dec. 1911, p. 253, U.C.L. Records Office.
66. Ibid, Vol. 8, No. 4, Dec. 1917, p. 130.
67. University College Magazine, Vol. 1, No. 5, March 1921, p. 227, U.C.L. Records Office.
68. Ibid, Vol. 2, No. 5, March 1923.
69. Newspaper World (1948), p. 73.
70. P Elliott (1978), p. 179; R Williams (1965), pp. 226-7.
71. H A Innis (1949), p. 21; S Puddefoot (1970), p. 75.
72. Girl's Realm (1909), p. 488.
73. E Settle (1937), p. 66.
74. Who was Who, Vol. 5, 1951-60, p. 920, see section on Viscountess Rhondda; B Vernon (1982), p. 56.
75. V Brittain (1980) p. 45.

76. E Settle, op.cit, pp. 21-2.
77. For complete accounts of the work of these women see: H van Thal (1979), p. 1 and pp. 72-7; E Moberly Bell (1947), p. 55, pp. 60-64, p. 79 and pp. 275-85.
78. Girl's Realm (1909), pp. 489-90; M Bateson, op.cit, p. 127.
79. V Brittain, op.cit, pp. 44-5.
80. Who Was Who, Vol. 8, p. 803.
81. B Vernon, op.cit, pp. 133-4.
82. Girl's Realm (1909), p. 490.
83. M Bateson, op.cit, p. 129.
84. V Wigfall (1980), p. 51.
85. Faculty of laws minute book, 1908-28, p. 120, U.C.L. Records Office.
86. A Spencer and D Podmore (1987), p. 113.
87. Ibid, p. 113 and p. 114.
88. H Cecil (1958), p. 630.
89. D Sugarman (1993), p. 297.
90. B Broadbent (1990), pp. 122-4.
91. A H Manchester (1980), p. 71; R Lewis and A Maude (1952), p. 49.
92. D Sugarman, op.cit, p. 297.
93. Minutes of college committee, October 1925-July 1926, Point 127d, Appendix VI.
94. For details of friction between ex-servicemen and the government, and the government's attempts to appease war veterans see: S R Ward (1975), pp. 23-7.
95. For an explanation of a low number of female engineering graduates, see details of the male dominated nature of the institutions of electrical and civil engineers, in: W J Reader, op.cit, p. 160 and G Watson, op.cit, pp. 129-30.
96. See M Sanderson (1972), pp. 321-3 and pp. 326-7 on women's opportunities in electrical engineering and scientific research.
97. This calculation is based on figures obtained from the annual reports, 1919-1931, U.C.L. Records Office.
98. College calendar, 1917-18, p. 18, pp. 107-8, p. 112 and pp. 118-9; college calendar, 1919-20, pp. 223-4.
99. H H Bellot, op.cit, p. 401.
100. Minutes of college committee, October 1925-July 1926, Point 127d, Appendix VI.



## **CHAPTER NINE:               SCIENTIFIC AND TECHNICAL TRAINING FOR WOMEN AT THE POLYTECHNIC AT REGENT STREET, 1918-1930**

### **SOURCES AND METHOD OF RESEARCH**

The source material used for this study was located mainly in the archives of the University of Westminster, formerly the polytechnic at Regent Street, although a small number of records were housed at the Greater London Record Office. A variety of documents were used, both published and unpublished. These need to be explained, to provide the reader with an idea of their usefulness, and also to indicate a number of problems which arose when attempting to use them.

A broad outline of the number and sex balance of students who attended the polytechnic was gained from a series of Candidate Books, based at the University of Westminster. These were unpublished, handwritten documents, which presented the names and numbers of polytechnic members, in separate volumes for males and females. Thus, counting the number of men and women was a straightforward process. These candidate books were available as early as the 1880s, and were simply continued in the same format through to the 1930s. They were useful, because they allowed male and female participation to be quantified, and also because they enabled a comparison to be made between women's involvement in the pre-war period and the interwar years. However, a problem was encountered when using this source. As for the pre-war period, the candidate books included details of polytechnic members, both social and educational. Chapter four explained that the polytechnic attracted a large number of young men and women to its social and recreational facilities, who were not always students of the polytechnic's educational department. This was as much a problem in the 1920s. It was not possible to isolate and exclude social members from the study, because they were not distinguished from educational members in

the candidate books, and in addition many social members also took part in educational classes.<sup>1</sup> Thus the numbers presented in table 9.1 are not an accurate representation of young people who studied at the polytechnic during the 1920s. According to a London County Council (L.C.C.) report of 1929, women were less likely to be social members than men because of an inferior range of recreational activities in which they could participate. Apparently the polytechnic had 1,500 female members and 4,500 male in this year.<sup>2</sup> Women then, comprised only twenty five per cent of the total. It should be borne in mind that table 9.1 significantly exaggerates male participation, and that a number of those recorded may not have participated in educational classes. Unfortunately, the candidate books are the closest that the archives have to a full student list.

In order to obtain more detailed information regarding the subjects studied by women, it was necessary to consult a different source, the Polytechnic Magazines. These were published annually and gave a good deal of useful background information on social and educational events. In addition, they provided lists of examination results. These were potentially very useful, because they enabled comparisons to be made between women's participation before and after the war by subject area, whilst easing the process of data retrieval by providing printed, rather than handwritten information. However, the magazines did not present the data as well as might have been hoped.

Firstly, although students who were studying full courses such as college diplomas or higher-national certificates had one definitive examination result printed at the end of their final year, this was not the case for those who were studying single subjects (usually over one year). The difficulty here was that the same student might have studied a whole range of individual subjects, but not one designated course, and therefore that his or her name cropped up on a number of separate occasions. Technically, a student should be given credit for

every course passed, as each was awarded by a college certificate, and as long as it is borne in mind that single course students studied at a much lower academic or technical level than full course students, their high numbers in comparison to the latter need not be a problem. It is not possible however, to comment on the significance of full course students as a percentage of the total, because the number of single course students is inflated by the way in which the data is arranged. More importantly, the proportion of women in the total number of single students and course students can be used, because the drawbacks of the documentation affect both sexes equally.

A greater complication arose when attempting to use the examination results. At various points during the 1920s, and with increasing frequency during the later years of the decade, departments began to record successful students by their initials rather than their first names. This created obvious problems when attempting to establish the sex balance of students at the polytechnic. Unlike U.C.L., where I assumed all initials to be male, it was quite obvious that such an approach, applied to the polytechnic figures, seriously disadvantaged women. For example, in the academic year 1918-19, the number of men and women who passed the stage three examinations of the Royal Society of Arts (R.S.A.) was equal, but by 1919-20, all students, with the exception of one male, were registered by initial. The information from 1918-19, and from later years in the decade demonstrated that women passed R.S.A. examinations in large numbers, and thus that it was not appropriate to assume that in the years when initials were presented, all students were male. The only way around this problem was to create three categories; 'male', 'female' and 'initials'. Although this was not ideal, it was possible to say something meaningful regarding the balance of the sexes when the number of 'initials' did not outweigh the combined number of male and female names. Where the number of 'initials' was far greater than the number of full names, it was

not realistic to comment on male and female levels of participation. Thus some of the trends between 1918 and 1930 are rather discontinuous.

A further source, the course registers, were helpful in alleviating some of the problems of gleaning data from the Polytechnic Magazines. Each volume provided a handwritten list of students on a particular course. As there was such a large number of single subjects on offer at the polytechnic during the 1920s, these volumes were numerous, and provided a huge quantity of data. Thus it was not possible to consult all the information. However, by using the initial results from the polytechnic magazines, it was possible to establish where the worst discrepancies lay, and thus to check those subject areas by reference to the course registers. The advantage of these volumes was that because they were handwritten, students were frequently recorded by their full names rather than their initials. Of course, the registers listed students who were in the process of studying, and therefore the number of names was higher than the number shown in the examination results, which listed passes only. Nevertheless, they enabled comments to be made regarding the proportion of females.

Finally, the Polytechnic Prospectuses gave valuable background information on course content, departmental structure, growth of subject areas and course fees, and provided a good deal of useful supporting information for the figures extracted from the magazines and registers. The Greater London Record Office, also housed some L.C.C. archives which related to the polytechnic at Regent Street. The L.C.C. funded Regent Street along with other London polytechnics from the early twentieth century. Most of the archives however ran from the 1930s, with only an inspectors report and a miscellaneous file existing for the 1920s. These provided a small amount of supporting information. In addition there was a full series of L.C.C. education committee minutes, which occasionally gave useful information on the polytechnic. The results of the processes described above will shortly be

presented. Firstly, something should be said about the development of the polytechnic after the First World War.

## **GROWTH OF THE POLYTECHNIC DURING THE 1920s**

There is very little literature on the polytechnic at Regent Street, or on the polytechnic movement in general during the 1920s. Most of the information relating specifically to Regent Street comes from the various books written by Ethel M Wood, previously Ethel M Hogg, the daughter of Quintin Hogg. In her History of the Polytechnic she shows that after the First World War the number of evening classes grew, so that over 1,000 were held weekly in more than 100 subjects.<sup>3</sup> This evidence indicates why it is so difficult to avoid duplication of student names when counting the numbers of students across such a wide range of courses. It also supports the argument that it is not possible to scrutinise all the course registers for every subject over the twelve year span of this study. Wood argues that polytechnic membership increased after 1918, and that the educational work of the institution also grew. According to an L.C.C. inspector's report of 1929, by that date the polytechnic catered for between 14,000 and 15,000 evening and 1,800 day students.<sup>4</sup> This occurred under the presidency of Sir Kynaston Studd, who was installed after the death of Quintin Hogg in 1903 and remained in this position until 1944.<sup>5</sup>

In addition to the growth of evening instruction, the number of full-time day classes expanded. By the 1920s there were ten day schools which consisted of a number of craft schools such as architecture and engineering, motor body building, motor and aero metal work, tailoring and hairdressing, all of which were available only to young men. In addition there were other schools such as chemistry, which prepared students for the London University external BSc degree, and commerce, matriculation and photography.<sup>6</sup> These

developments signify the growing importance of education in the interwar period, and the beginnings of a movement towards full time instruction. They do not suggest a period of 'stagnation' in educational provision. However, the sex exclusiveness of some of the schools shows that in spite of their efforts during the First World War, certain subjects were still not deemed appropriate for women. In evening classes however, barriers to female education were less obvious, although in a number of practical trade classes it was still necessary, as before the war, for students to be active within the trades they were studying.<sup>7</sup> The restriction of many practical trades to men in the interwar period meant that in practice women were highly unlikely to choose such course options. During the 1920s a number of building programmes were also carried out which increased capacity and enabled educational activities to grow. The Regent Street site was expanded between 1926 and 1927 at a cost of £250,000 and a new building at Little Titchfield Street was acquired to house the women's institute and several departments.<sup>8</sup> Thus the polytechnic grew physically and also increased its number of educational classes. The impact of these changes on female participation is discussed below.

## **POLYTECHNIC MEMBERSHIP**

The figures shown in table 9.1 are of members of the polytechnic between 1918 and 1930. It should be borne in mind that these levels of participation are not entirely representative of the number of people who were involved in educational activities, because the data includes social members. As male social membership was a good deal higher than female, the number of men shown in table 9.1 is disproportionately large. In addition, it was not a requirement to 'join' the polytechnic in order to enrol for an educational class, and thus a number of young people were educated at the polytechnic without necessarily being included in the membership figures. However, polytechnic members were offered a reduction of

twenty five per cent on nearly all evening class fees,<sup>9</sup> which must have encouraged many to 'join' the polytechnic if they wished to study, and in addition, a pamphlet produced by the polytechnic claimed that most social members of the polytechnic had been students at some point.<sup>10</sup> Most evening courses cost between £1 and £1 10s per annum by 1930. On this basis, twenty five per cent savings would reduce fees to between fifteen shillings and £1 2s 6d, a significant reduction. However, in 1930 the cost of joining the polytechnic as a member was 10s 6d for men and 7s 6d for women because they had fewer recreational facilities, and there was also a one off registration fee of one shilling for both.<sup>11</sup> The combined cost of membership and a reduced course fee was therefore between £1 3s 6d and £1 11s for women and £1 6s 6d and £1 14s for men. Joining the polytechnic in order to gain reduced educational fees was thus something of a false economy, which resulted in a higher cost than the standard course fee, and it is unlikely that many students chose this option. For a student who wished to study more than one course however, economies could be made by gaining polytechnic membership. The extent to which the figures of polytechnic members are representative of the number of students between 1918 and 1930 is thus not resolved, but certainly the data must be treated with caution.

The results from table 9.1 show that on average, women comprised just over twenty eight per cent of total polytechnic members between 1918 and 1930. Given that 1918 was atypical due to the absence of large numbers of men who were fighting in the First World War however, an average based on the years 1919-1930 may be more reliable. This calculation reduces the female proportion of all members to 26.9 per cent. The overall figure is pulled down somewhat by a low level of female participation between 1922 and 1925 which fell to its nadir, twenty per cent in 1924. This figure was lower than any experienced by women before the First World War, as shown in table 4.1, which challenges the assumption that the war acted as an engine of change for women's opportunities. In fact, the average

proportional participation of women at the polytechnic was only two percentage points higher in the 1920s than it had been before 1913, if 1918 is included. If not, women's proportional participation appears not to have changed at all as a result of the war.

**Table 9.1**                      **POLYTECHNIC MEMBERSHIP, 1918-1930**

	<b>Total membership</b>	<b>Female membership</b>	<b>Female members as % of total</b>
1918	898	545	60.7
1919	3,279	964	29.4
1920	3,644	1,136	31.2
1921	2,689	904	33.6
1922	2,028	498	24.6
1923	1,964	422	21.5
1924	1,881	380	20.2
1925	2,128	487	22.9
1926	2,305	668	29.0
1927	2,566	703	27.4
1928	2,588	657	25.4
1929	2,934	834	28.4
1930	<u>3,353</u>	<u>997</u>	<u>29.7</u>
<b>Average</b>	2,481	707	28.5
			26.9 (based on the years 1919-30)

**Source:**        Candidate books, 1918-1930, p106a and p107a, University of Westminster archives.

This implies at first glance, that women gained very few new opportunities in further education during the 1920s, and that the notion that female opportunities progressed in a linear manner does not apply to all educational sectors and can be misleading. These findings, when compared to those of U.C.L. during the 1920s seem unimpressive, and suggest that Neal Ferguson's belief that working class women gained very little at the end of the war compared to highly educated, upper middle-class women is realistic.<sup>12</sup> The following sections will show however, that the range of courses in which women participated at the polytechnic increased. A consideration of individual subjects it seems, is the only



means of gaining a good impression of female participation in further education, given that the membership figures do not necessarily portray those who attended Regent Street for educational reasons. Firstly, a few comments should be made regarding these polytechnic members.

In contrast to the type of women who studied at U.C.L., women who attended evening classes at the polytechnic were probably directly involved in the war effort between 1914 and 1918, working hard long hours during the day. This meant that their time was more restricted than that of wealthier women and that numerically their participation in education was less likely to increase in the absence of males during the war. There was a surge of both male and female participation after 1918 however, when each group was relieved from its war responsibilities. Female membership grew from 545 in 1918 to 1,136 by 1920. The number of men and women who registered with the polytechnic fell between 1921 and 1924, however, although the female rate declined more rapidly than the male. This may have resulted simply from a decline in the novelty of social or educational membership after an initial surge of keen young people after the war. There is certainly no indication in the prospectuses of a wide scale closure of courses, on the contrary, educational provision was increasing after 1918.

The fall in polytechnic membership coincides with the economic slump in Britain described in chapter six. It is conceivable that families, or the young individuals themselves, became less willing to pay for education or recreation during a period in which money was scarce, especially for those suffering unemployment. It is even more believable that families prioritised the education of a son over a daughter, which may help to explain why female participation declined more rapidly than male. The polytechnic drew the vast majority of its members from London, however, and thus serviced a geographical area which is perceived

to have suffered less drastically from the slump than other areas of Britain although the East End fared badly. The extent to which economic factors can be seen as an explanation for a falling polytechnic membership is thus, uncertain. By 1926, male and female participation was increasing again, perhaps aided by the expansion of accommodation after this date, and the proportion of female members increased a little. However, across the whole decade female participation remained relatively low, and increased little on the pre-war rate. The following sections consider the subjects taken by men and women at the polytechnic between 1918 and 1930, with the aim of establishing the level of female involvement in different courses, and perhaps a more accurate representation of female participation at the polytechnic than that offered by the membership figures.

## **CITY AND GUILDS EXAMINATION RESULTS**

The tables which follow give details of students who passed examinations in City and Guilds subjects, the polytechnic's own certificates after one year of study, or diplomas after three to five years of study, commercial subjects, and higher national certificates. All the results are of evening students only, in order to facilitate an accurate comparison with the pre-war years. The female percentage of total examination passes is presented only where the number of students listed by initials is significantly lower than the number of full names. This method ensures that 'named' males and females are in the majority in each calculation, and thus that the results do not contain large numbers of undefined students, and can be considered reliable. Table 9.2 outlines results in City and Guilds examinations.

**Table 9.2 CITY AND GUILDS EXAMINATION RESULTS, 1918-1930  
(FINALISTS ONLY)**

Year	Total passes	Female passes	Initials	Female passes as % of known males and females
1918-19	30	2	2	7.1
1919-20	90	4	67	N/A
1920-21	166	11	66	11.0
1921-22	171	13	11	8.1
1922-23	176	5	67	4.6
1923-24	157	15	89	N/A
1924-25	130	16	53	20.8
1925-26	131	7	73	N/A
1926-27	137	8	116	N/A
1927-28	125	7	19	6.7
1928-29	122	0	122	N/A
1929-30	<u>106</u>	<u>0</u>	<u>106</u>	<u>N/A</u>
Average	128	7	66	11.2

**Source:** Polytechnic Magazines, 1918-1930, University of Westminster archives.

It is not possible to depict any clear trends in this data because of the problem of large numbers of initials, in some cases making it impossible to comment on the female proportion of total students. It is thus more appropriate to mention that in all years, apart from 1924-25, where women accounted for just over twenty per cent of the total, female participation in City and Guilds subjects was low. In this year, a particularly high number of women passed examinations in plain cookery, which accounts for their larger proportional share. Women do not appear to have been advantaged by the absence of males in 1918, and thus an average based on the whole period 1918-1930 is reliable. Their average rate of participation was just over eleven per cent across the decade, which can by no means be considered large. However, compared to the pre-war figures, shown in table 4.2, women's proportional participation in City and Guilds subjects had more than doubled, signifying a slight shift in favour of practical trade classes. This finding should be treated with caution however, because the female percentage of total students was based only on known males and

females, and discounted all initials. Thus the figures presented in table 9.2 contain a fair margin of error.

Women's participation was not only numerically small, but they also participated in a very narrow range of subject areas. In twenty five out of thirty one subjects, no female names occurred across the twelve years covered by this study.<sup>13</sup> Furthermore, although there were two subjects in which women comprised 100 per cent of all students, these were what might be considered 'traditionally female' disciplines; cookery and dressmaking. They also participated in the study of oils and fats, magnetism and electricity, photography and telephony, but in much smaller proportions, from twelve per cent in photography to 1.5 per cent in telephony. The reason for women's participation in these areas was probably that they were able to gain employment with such qualifications after leaving college, because the various catering, tailoring, telephony and photography industries offered some opportunity to women. Women's lack of involvement in the many other City and Guilds subjects, such as engineering, cabinet making, brickwork and brewing, to name a few, probably resulted from a perceived lack of ability to enter such trades after qualifying because of their heavy male domination. In addition, given that most of these courses were not offered to students unless they already practised the trade, it was even less likely that women would enrol.<sup>14</sup>

Although women's participation in a number of 'new' light industries grew during the 1920s, it seems that most working-class women who participated in such trades worked in relatively unskilled posts which required little training. It has been argued however, that the concepts of 'skilled' and 'unskilled' work have been constructed by a male perception of the value of different types of employment.<sup>15</sup> Thus the work done by women was not necessarily 'unskilled', but carried low status, poor wages and little chance of promotion. Catterall points out that although the number of women working in engineering grew by around 123

per cent between 1921 and 1931, much faster than the male rate, most were in assembly line sections carrying out work such as coil winding and electric lamp and valve assembly. Although these jobs required dexterity and precision, and thus should not be labelled as 'unskilled', few held opportunities for promotion.<sup>16</sup> It seems unlikely that women would have been particularly attracted to courses in engineering, especially when at the highest levels of the profession, and in the engineering societies, opportunities for women were slight, and barriers to progression were great.<sup>17</sup> Similarly in the rayon trade, although a large number of women participated, they were predominantly young girls, employed in reeling and sorting rather than in the sections of the trade which were perceived as skilled and paid higher wages.<sup>18</sup> Miriam Glucksmann points out that although female employment in light scientific industries grew significantly in the interwar years, the level of technical training received by women was minimal<sup>19</sup>, and it seems that there was little incentive for these women to seek alternative training at institutions like the polytechnic at Regent Street, presumably because opportunities for progression within their trades were so slight. Glucksmann contends that women were generally employed for their perceived tolerance of repetition, passivity and obedience to authority, and that few were trained, because managers regarded women as temporary workers who would leave work on marriage.<sup>20</sup> The small number of women who participated in City and Guilds examinations is not especially surprising then, and reinforces this view.

Because of the ambiguity of the figures shown in table 9.2, and the sometimes high numbers of students recorded by initials, it cannot be argued that the participation of women in the various City and Guilds courses was exactly as described in the previous discussion, and a few women may have studied some of the courses which at present show no female involvement. However, virtually all of the twenty five courses in which women appear not to have participated were recorded in at least one year out of twelve as having all male

participation, no initials and no females. Thus, even if the occasional female name has been obscured by the frequent use of initials, it does not appear that women comprised a significant proportion of total students in any of these subjects, and any involvement which has not been recorded was marginal. For this reason, there was little purpose in consulting individual course registers in search of full names, but rather, it seemed realistic to accept that female participation was low, mainly due to the existence of trade restrictions. Although it can be argued that when female participation occurred it was largely in very traditional areas of education, the numbers of women who studied cookery (seventy one) and needlework (three), were small in comparison with their participation in other areas of the curriculum. Thus it is incorrect to suggest that women merely opted for subjects with a domestic orientation, as the following section demonstrates.

#### **DEPARTMENT OF COMMERCE EXAMINATION RESULTS**

In contrast to City and Guilds examinations, women's participation in commercial courses was significant, averaging just under thirty per cent across the period 1918-1930 as table 9.3 shows. Unfortunately the inclusion of large numbers of initials, especially in the academic years 1919-20, 1927-28 and 1928-29, disrupts any trends which might be observed. However in two years 1918-19, and 1924-25 all examination results were given by full name, and the female proportion of total students was 37.7 per cent and 31.4 per cent respectively. The two years 1922-23 and 1929-30, when the number of initials was large, but still smaller than the combined number of male and female names, show the smallest levels of female involvement of those observed, 24.7 per cent and 28.3 per cent. This suggests that women were more likely to be listed by initials than men, and that where the number of initials was small, or non existent, the female proportion of the total was higher, averaging around one

third of all students, a very robust figure. The average of 29.4 per cent is thus more probably an underestimate than an exaggeration.

**Table 9.3 DEPARTMENT OF COMMERCE EXAMINATION RESULTS, 1918-1930 (FINALISTS ONLY)**

Year	Total passes	Female passes	Initials	Female passes as % of known males and females
1918-19	53	20	-	37.7
1919-20	158	0	157	N/A
1920-21	252	25	128	N/A
1921-22	127	18	72	N/A
1922-23	133	20	52	24.7
1923-24	149	49	13	36.0
1924-25	118	37	-	31.4
1925-26	112	39	6	36.8
1926-27	155	16	83	N/A
1927-28	129	0	126	N/A
1928-29	92	0	91	N/A
1929-30	<u>105</u>	<u>17</u>	<u>45</u>	<u>28.3</u>
<b>Average</b>	132	20	64	29.4

**Source:** Polytechnic Magazines, 1918-1930, University of Westminster archives.

The inclusion of the academic year 1918-19 in the average is not problematic, because in 1924-25, the other year in which no initials were used, women comprised an equally high proportion of total examination passes, and thus do not appear to have been advantaged by the absence of males in 1918. The implication is that commercial courses were popular amongst women. Table 9.4 provides more detailed information on the type of commercial training which they favoured.

**Table 9.4 BODIES AWARDED QUALIFICATIONS IN COMMERCE, AND WOMEN SUCCESSFUL ON EACH, 1919-1930**

Awarding Body	Number of women	% of women
Chartered Institute of Secretaries	8	32.0
Royal Society of Arts, (RSA) Stage 3	163	31.1
London Chamber of Commerce	63	24.2
Polytechnic Institute (school of commerce):		
a) Journalism	24 initials, 7 female names, no male names	?
b) Industrial Administration	42 initials, no male or female names	?

Source: Polytechnic Magazines, 1918-1930, University of Westminster archives.

Women's proportional significance was highest in the examinations of the Chartered Institute of Secretaries and the Royal Society of Arts, with the latter accounting for by far the largest number of women, 163 between 1918 and 1930. This should be compared to the number studying cookery to show that 'approved' options were not the most popular amongst women who attended the polytechnic. Critics might suggest however that R.S.A. successes highlight a known trend of the interwar years, that 'white blouse' work such as typing, shorthand and clerking became regarded as 'women's work', and thus that these findings are not surprising. However a brief study of those who passed their R.S.A. stage three in the academic year 1918-1919, and the breakdown of subjects studied shows a much broader range of qualifications. The findings are shown in table 9.5.



**Table 9.5 COURSES TAKEN TO OBTAIN THE STAGE THREE CERTIFICATE OF THE ROYAL SOCIETY OF ARTS, 1918-1919**

Courses Passed	Male	Female	Female % of total
Bookkeeping	10	3	23.1
French	4	6	60.0
German	-	4	100.0
Italian	-	3	100.0
Spanish	1	-	-
Commercial Law	4	2	33.3
Company Law	4	1	20.0
Banking	-	1	100.0
Accounting	1	-	-
Theory and Practice of Commerce	3	-	-
Shorthand	-	1	100.0

**Source:** Polytechnic Magazine, 1918-19, Vol. LIX, p. 111, University of Westminster archives.

It is perhaps surprising, in the light of conventional beliefs, that the subjects in which women were most prominent numerically were languages, bookkeeping and law, with shorthand playing a marginal role. This confirms the growth of white collar careers for women in the interwar period, but does not necessarily show that they trained for designated 'female' occupations. Their participation was greatest in the area of languages, which, Sanderson has argued, was of increasing importance to industry and the economy after the First World War,<sup>21</sup> especially if studied in relation to commerce. The London Chamber of Commerce offered a similar range of courses, but with less emphasis on clerical training and more on commercial law, accountancy and bookkeeping. It is significant then that women comprised one quarter of all successful passes under this examining body. Table 9.4 shows that the polytechnic offered its own commercial training in industrial administration and journalism, but unfortunately, for both courses, the vast majority of candidates were listed by initials. Table 9.6, however provides information which was obtained from the course registers

regarding the number of men and women who studied journalism. Sadly the course in industrial administration does not appear to have been covered by these volumes.<sup>22</sup>

**Table 9.6 STUDENTS OF JOURNALISM, 1920-1924**

Year	Total students	Female students	Female students as % of total
1920-21	40	13	32.5
1921-22	44	24	54.5
1922-23	24*	9	37.5
1923-24	<u>8</u>	<u>3</u>	<u>37.5</u>
Average	116	49	42.2

\* There were an additional six students recorded only by their initials in this year.

**Source:** Course registers for 'higher commerce', 1920-1924, University of Westminster archives.

In both the Polytechnic Magazines and the course registers, figures for journalism first appeared in 1920 and ceased in 1924. Given the declining number of students in 1922-23 and the very small participation in 1923-24, it appears that the course in journalism was closed after this date. The prospectuses show that in the academic year 1922-23, journalism was a subject within the department of commerce. However from 1923 onwards it only appeared as a small course within the department of modern languages.<sup>23</sup> This explains why it ceased to be offered as an examination subject, and why it no longer appeared in the course register for higher commerce after this date. It was not possible to search through the languages registers for isolated references to journalism, because as table 9.9 shows, the number of entries for each year was exceptionally large. For the four year duration of the course however, women comprised a very large proportion of total students, averaging over forty two per cent. This confirms that the findings from U.C.L. during the 1920s were not unique, and that journalism was a growing field of opportunity and choice amongst women.

Although it was the belief of Mr T Clarke that the number of women studying journalism in Britain far outweighed the number who would succeed as journalists,<sup>24</sup> it is not surprising that women rated their chances of employment more highly in a profession which offered opportunities to freelance, and thus avoid a male dominated office environment, and in which a number of women had succeeded as high profile journalists,<sup>25</sup> than in other, more heavily restricted professions such as law and engineering. The overriding impression is that commercial classes, especially in journalism and languages, were popular choices, presumably because women felt that employment prospects in this area were reasonable. The proportion of female commerce students was also high when compared to their percentage of polytechnic members, which suggests that this was an especially popular area of study. Unfortunately, the absence of commerce data for the pre-war period means that it is not possible to establish whether this popularity was new in the interwar period, or an extension of a pre-war trend. It is certainly the case that female participation was high in subject areas which offered realistic employment prospects, and there is no doubt that these courses were vocationally orientated.

## **POLYTECHNIC INSTITUTE EXAMINATION RESULTS**

The following section considers women's success in the various scientific and technical qualifications awarded by the polytechnic between 1918 and 1930. Unfortunately, the data inadequacy shown in table 9.7 is so great, that it is virtually impossible to say anything meaningful about female participation in the institute's own examinations. The only two years which come close to offering reliable statistics are 1920-21, where the number of known men was 344, the number of initials only eighty one, and the number of females, nineteen. A calculation based on the male and female names shows a female proportion of 5.2 per cent of the total. In 1918-1919 however there were forty two known male passes,

ten known female passes and forty five initials. Women here comprised 19.2 per cent of the total. The problem of reliability, of course, lies in whether initials represented predominantly male or female students. There seems little point in attempting to break down rates of participation by departments and schools, because for three of the years, each student on every course was registered by initial and for a further four years this was the case for virtually every examination pass, with the exception of a handful of known names. It is worth mentioning however, that certain courses, which never or rarely gave examination results by full name might have been expected to contain female students.

**Table 9.7 POLYTECHNIC INSTITUTE EXAMINATION RESULTS, 1918-1930  
(FINALISTS ON FULL COURSES AND SINGLE COURSE STUDENTS)**

Year	Total passes	Female passes	Initials	Female passes as % of known males and females
1918-19	97	10	45	19.2
1919-20	345	22	244	N/A
1920-21	444	19	81	5.2
1921-22	456	10	217	4.2
1922-23	447	4	232	N/A
1923-24	394	0	386	N/A
1924-25	725	0	725	N/A
1925-26	566	0	566	N/A
1926-27	665	5	583	N/A
1927-28	641	0	641	N/A
1928-29	476	2	472	N/A
1929-30	<u>599</u>	<u>6</u>	<u>593</u>	<u>N/A</u>
Average	488	6	399	6.7
				6.5 (based on the years 1919-30)

**Source:** Polytechnic Magazines, 1918-1930, University of Westminster archives.

The Natural Science Department, which ran courses in human physiology, hygiene, agriculture and horticulture, recorded female names in 1920, as did the school of photography between 1919 and 1922. For all years between the opening of the school of

tailoring in 1921 and 1930, students were never specified by first name, and yet it was a school in which women probably participated, especially given that different examinations could be sat in gentlemen's and ladies garment cutting. However, the inadequacies of the data from the Polytechnic Magazines are such that it was not possible to identify men from women. This is a very real problem when considering female participation in many institutions, and the historical image of low female involvement in various fields of education may well have stemmed in part from a tendency to take problematic data at face value, and assume that initials always signified males. Table 9.8, presents figures which were obtained from the course registers, and shows how false this assumption can be.

**Table 9.8 STUDENTS OF NATURAL SCIENCE, PHOTOGRAPHY AND TAILORING, AGGREGATES FOR VARIOUS YEARS, 1918-1930**

Course	Total students	Female students	Female students as % of total
Agriculture and horticulture	154	44	28.6
Physiology and hygiene	166	103	63.8
Photography	2,069	901	43.5
Tailoring	1,658	286	17.2

**Source:** Course registers for photography, 1918-22, 1924-25 and 1926-30, Balderton Street classes, 1918-1930 and science courses, 1918-1924, University of Westminster archives.

The numbers of men and women who studied each of these different courses are not really comparable because, the series of course registers was more interrupted for some subjects than others. Tailoring, for example had a complete run from 1918-1930 whilst photography had three years of missing information. However, it is possible to make meaningful comments about the proportion of men and women studying each course. Women participated to a greater or lesser extent in all of these subject areas, a finding which the original data did not immediately suggest. In physiology and hygiene, their participation was

particularly high at 63.8 per cent of the student body. However table 4.3 showed that before the First World War, the percentage of women who passed examinations in the field of human biology, which included physiology and hygiene, was higher than that of those who studied physiology and hygiene during the 1920s, at just over seventy one per cent. Although the two sets of data are not directly comparable, because the former are examination results, and the latter students, it appears that female participation did not merely increase in a linear fashion in this area. This is not particularly surprising given that women participated in a greater range of scientific courses in the 1920s than before 1914, and thus that there was less concentration in one subject area. In contrast, their slightly reduced participation in physiology and hygiene classes may be an expression of diminishing employment prospects. Davies and Williams have shown that the profession of sanitary inspection which was expanding for women after 1870, and in which women and men competed directly after about 1890, was reduced by 1911. This was an occupation which was of potential interest to women trained in hygiene. In 1911, male sanitary inspectors protested that because women dealt predominantly with women and babies their status should not be equal to that of male inspectors, and this contributed to a growth of local authority employment of female 'health visitors' in preference to 'sanitary inspectors'. The former were poorly paid, and required less training than the latter.<sup>26</sup> Edith Morley, writing about women's work opportunities in 1914 confirmed this trend, showing that many authorities were being encouraged to replace female sanitary inspectors with health visitors. The distinction between the two was straightforward and significant:

'A woman sanitary officer is a statutory officer with a legal position. A health visitor is a purely advisory officer with no legal rights to carry out the provisions of the public health acts'.<sup>27</sup>

Therefore, female employment opportunities, in an area which may well have appealed to those trained in physiology and hygiene, declined, perhaps reducing the incentive to study

these subjects. However, women's participation in agriculture and horticulture increased from twelve per cent of total examinees between 1897 and 1911 to 28.6 per cent of all students during the 1920s, as demonstrated by comparing table 9.8 with table 4.3. It was not the case that female participation declined in all areas. A contemporary journal which gave advice to educated women wishing to pursue careers, referred to horticulture and gardening as growing areas of employment for women. Firstly, posts as teachers of horticulture were opening up as part of the drive towards teaching 'the working classes' the importance of open air interests, and secondly, women were increasingly setting up in business as market and landscape gardeners in the early twentieth century,<sup>28</sup> a trend which had begun in the later nineteenth century.<sup>29</sup> In addition women's involvement in photography classes was very significant, and their numerical presence was high. This is also an area in which female participation increased significantly on pre-war levels. Only twenty four women took examinations in photography between 1895 and 1904 in contrast to 382 men, comprising only six per cent of the total,<sup>30</sup> whereas during the 1920s, 901 women took photography courses, accounting for 43.5 per cent of all students, a dramatic increase. The reason for this growth of interest appears to have been linked to vocational opportunities. Towards the turn of the century, the number of female photographers in Britain increased, so that by 1891 they accounted for around twenty four per cent of the profession.<sup>31</sup> It was argued, in the Girl's Realm of 1901-2 that women had a particular flair for taking photographs of women and children, and that many had, even at this early date, set up their own businesses. For those who did not have the necessary capital, jobs were widely available which paid over thirty shillings per week.<sup>32</sup> The Realm reported that:

'Both men and women photographers now employ young women almost exclusively in preference to men as assistants'.<sup>33</sup>

The continuance of this trend was noted in the polytechnic prospectus of 1922-23, which commented on the growing attractiveness of photography to women, both as an area of study, and as a field of employment: 'Photographic portraiture is every year becoming more and more a vocation for women, and it is safe to predict that in the near future this branch will be dominated by them'.<sup>34</sup> This strongly suggests that women's level of involvement in various subject areas was dictated by their ability to gain reasonable work after qualifying, and not by amateur interest alone. Even in tailoring, traditionally a male dominated field of employment, women comprised over seventeen per cent of students. Given that only three women gained City and Guilds qualifications in dressmaking over the whole period 1918-1930, this signifies an important shift in female work patterns, and that although opportunities for women were still inferior to those for men, a larger number were moving into areas of the clothing trade which carried high esteem and status. A journal, published by the Central Bureau for the Employment of Women stated that tailoring was a trade increasingly being broken into by women. This was because they could earn more than in dressmaking, and because of increased female demand for tailored items such as jackets, in line with changes in fashion.<sup>35</sup> The results from this section are very positive, indicating the inadequacy of the initial data from the polytechnic magazines and showing how easy it is to gain a false impression of female involvement in further education.

Languages was another area in which the magazines underemphasised female participation. The languages department attracted large numbers of students each year, between fifty one passes in 1924-25 and ninety seven passes in 1929-30. However, once again, all students were registered by initial for the whole period. Bearing in mind the greater tendency of women to pass commercial examinations in languages than men, it is conceivable that they comprised large numbers in the department of languages and that there was a greater tendency for female levels of participation to be underemphasised by the failure to record



students by their full names than was the case for men. Table 9.9 shows that female participation as students in the department of languages was large.

**Table 9.9 STUDENTS OF LANGUAGES, 1920-1928**

Year	Total students	Female students	Female students as % of total
1920-21	1,772	979	55.2
1921-22	1,519	878	57.8
1922-23	1,852	1,104	59.6
1923-24	2,121	1,336	63.0
1924-25	2,591	1,694	65.4
1925-26	2,907	1,781	61.3
1926-27	2,848	1,762	61.9
1927-28	<u>3,453</u>	<u>2,019</u>	<u>58.5</u>
Average	2,383	1,444	60.6

**Source:** Course registers for languages 1920-1928, University of Westminster archives.

The total number of students who studied languages was exceptional. In fact a strange anomaly is that in some years the number of languages students was larger than total polytechnic membership seen in table 9.1. It seems that because it was not a requirement to 'join' the polytechnic in order to study, a significant number of evening students chose not to do so,<sup>36</sup> which reinforces the point that table 9.1 should be treated cautiously as an indicator of the number of young people who sought an education at the polytechnic. The number of language students was also exceptionally large when compared to other areas of the curriculum. This can be explained quite easily. Whereas some course registers contained details of a number of different subjects, for example the 'science' register covered natural science, mathematics, physics and electrical engineering, other subjects had a whole volume dedicated to them, for example languages, chemistry, photography and tailors cutting. The reason appears to be that in the latter type of volume all students were recorded, whether they were studying single 'one off' courses, or complete programmes,

whereas the former type only listed those who were 'full course' students, hence the numbers are much smaller in such subjects. This helps to explain why the number of people recorded as photography and tailoring students in table 9.8 was so much higher than the number who studied the natural sciences.

This diversity of recording did not commence until 1920 in languages and 1919 in chemistry. For the earlier years, each subject was listed along with a number of others in one volume. Thus, in these years, numbers were smaller, and cannot be compared with the data after 1920, which is why table 9.9 deals only with students in the department of languages from 1920 onwards. The absence of figures for 1929 and 1930 is because the volumes for these years have not survived. The number of languages students, when compared to those on other courses which used the same recording method such as photography and tailoring was still especially large. In aggregate, 19,063 people studied languages between 1920 and 1928 compared to 2,069 photography students. The reason for this was probably that the languages department included a vast range of courses, from French, German and Italian through to book-keeping with languages, phonetics, and salesmanship with languages, whereas photography contained a smaller number of options. It looks probable that there was some overlap in the course registers with the commercial classes outlined in table 9.5, and thus that some figures have been duplicated. This is unavoidable when using records which outline students studying particular subject areas, but not the examinations for which they were preparing.

This reinforces the point that for the whole of this study it is not possible to comment definitively on the numerical participation of men and women at the polytechnic. It is clear however, that women comprised a very large proportion of total students in the department of languages, averaging over sixty per cent during the 1920s. It has been shown that the

courses covered by this department were often vocational, for example book-keeping and salesmanship, which retained its masculine title, although women increasingly studied it. In addition, all pure languages were modern: French, German, Russian and Spanish for example. Thus, the argument that the men and women who studied such subjects wished simply to gain a liberal, non-vocational education was not necessarily valid, although a number probably studied out of interest, rather than through any particular desire to use their skills vocationally. It is important however, that women comprised a significant majority in this department, especially given that not one female name was presented in the examination results in languages, for the whole period. This could easily have presented a negative impression of female educational involvement at the polytechnic.

It has been shown that in all the areas of education so far considered, with the exception of the practical trade classes which led to City and Guilds qualifications, women constituted a significant proportion of total students, especially in commerce, journalism, physiology and hygiene, photography and languages. This strongly suggests that the female membership figures shown in table 9.1 are misleading, and probably account predominantly for social and not educational membership. A calculation of women's involvement in all the subjects considered so far shows a rate of participation of thirty seven per cent. This includes their very small participation in City and Guilds subjects which pulled the figure down. It certainly appears realistic to suggest that women accounted for around one third of all students at the polytechnic rather than to accept the twenty eight per cent suggested by the membership figures, and thus that women were proportionately more significant at the polytechnic than originally implied. The knowledge that before the First World War, L.C.C. records showed there to have been a female participation of over forty four per cent at the polytechnic, far higher than that suggested by the candidate books, adds to the caution with which the membership figures should be judged.

Other courses which were offered by the polytechnic however, and which are included in the figures in table 9.7 had low rates of female participation. Although passes in the school of motor body building, were almost entirely given as initials for example, it is unlikely, for the same reasons as the practical trade classes which led to City and Guilds examinations, that women participated in large numbers in this area. The lack of high level employment opportunities for women in the motor industry probably deterred most from enrolling, and encouraged them to gain education in areas which held out good opportunities for later employment. The School of Architecture examination results were presented after 1924 by initials only, However, between 1918 and 1923 more reliable figures are given. Twenty two men passed the finals of the five year course in architecture over this period, but no female names appeared and neither did any initials. Over the same period 244 men, two women and twenty six unspecified students, took single courses in architecture. This implies, that although the figures are non-specific after 1924, they probably account largely for male students. Reasons for this low level of female participation include that although women could enter the Royal Institute of British Architects from the late nineteenth century, by 1922 there were only five female members and thus a lack of role models in a heavily male dominated profession. In addition the close connection of the architectural and building trades meant that most did not consider architecture a suitable area of employment for women.<sup>37</sup> A contemporary article regarding women in the architectural profession stated:

'They will have to overcome many difficulties, allay many prejudices and gain the confidence of that section of the public that dabbles in bricks and mortar, and I am afraid that they will find a good deal of prejudice in the ranks of the architectural profession itself, not only among practising architects, many of whom consider quite honestly that architecture does not come within the legitimate sphere of women's work, but also amongst the rank and file of assistants who see the possibility of less employment and reduced wages'.<sup>38</sup>

However, at U.C.L., women increasingly participated in architecture during the 1920s as table 8.8 demonstrated. This suggests that at professional levels, opportunities for women were broadening but that at trade level their participation was more restricted. In the school of engineering, in contrast, at no point between 1918 and 1930 was one female name presented, even for a single subject, although a number of male names appeared in addition to the initials. This implies that engineering was an area of study which simply did not attract women. There are a number of explanations for this, which were outlined in chapter eight, because U.C.L. also failed to attract women to study engineering. Given that the first woman became an associate member of the Institution of Civil Engineers in 1927, and that by 1957 there were only five female names on the role<sup>39</sup>, it is likely that many women believed engineering to be an area of employment which was simply not available to them, and therefore did not consider it an option. Reader argues that the language used by the engineering profession was so masculine that women felt excluded even though technically, they could qualify as engineers.<sup>40</sup> In practice, this was made difficult, because women were prevented by law from working night shifts until 1934, and female apprentices had to be supervised by another woman,<sup>41</sup> which did not make female engineers a popular choice for most engineering firms, and only increased women's struggle to enter this profession. The low level of female participation in the school of engineering at the polytechnic, should not be regarded with great surprise.

In the department of electrical engineering however, although there were twenty male course finalists between 1918 and 1923, after which all students were reported by initial, and there were no female names, women did participate in single subjects. Seven women were recorded as having passed electrical engineering examinations over this period whilst 331 men succeeded in such examinations. A further 130 passes were listed by initials, and whilst these were probably male, it is worth clarifying this, by reference to the course registers,

given that light electrical engineering was a growing area of employment for women in the interwar period.<sup>42</sup> Unfortunately, the course registers only provided information on electrical engineering students for the two years 1918-19 and 1919-20. Over these years, 523 men, but only eight women were studying electrical engineering. It does not appear that, even if information had existed for the full period, the course registers would tell us anything which the examination results do not. It appears that electrical engineering was an area which, although probably in greater demand amongst women than other areas of engineering, simply did not hold much attraction. Catterall's point, that although many women worked in electrical engineering during the 1920s, the vast majority were to be found in low paid positions with little possibility of promotion,<sup>43</sup> probably goes a long way in explaining a low level of female education and training in this area.

The department of mathematics and physics rarely used full names when reporting its examination results. The only year in which it did was 1918-19, when interestingly, female names appeared. It was therefore important to follow up this area in the course registers, especially given that prior to the First World War, women comprised twelve per cent of total students in mathematics (See table 4.3). If we assume that the 1920s saw a broadening of opportunities for women, then their participation should, at the very least have been comparable with their pre-war levels of participation. The chemistry department was the last of the institute's subject areas to be considered, and again, data was very patchy. Initials took over in 1921, and before that date only two female names occurred compared to seventy five male and thirty seven initials. There is still a good deal of ambiguity surrounding the sex of these non-specified students, especially given that women participated in chemistry prior to the First World War. Table 9.10 which is based on data gleaned from the course registers for these subjects helps to clear up some of these uncertainties.

**Table 9.10 STUDENTS OF MATHEMATICS, PHYSICS AND CHEMISTRY, AGGREGATES FOR VARIOUS YEARS, 1918-1930.**

Course	Total students	Female students	Female students as % of total
Mathematics	439	52	11.8
Physics	78	19	24.4
Chemistry	2,097	236	11.2

**Source:** Course registers for science: 1918-1924 for mathematics and 1918-19 and 1921-24 for physics. Course register for chemistry, 1918-1922, 1924-25 and 1927-28, University of Westminster archives.

The very large number of students studying chemistry compared to mathematics and physics is a little misleading, and results from the fact that, like languages, chemistry students were listed in an individual volume, whereas mathematics and physics were two of a number of subjects covered by a general 'science' register. Chemistry therefore probably includes single and full course students, whereas physics and mathematics only recorded students who were studying complete courses. The proportion of women who studied mathematics and chemistry was almost the same, 11.8 per cent and 11.2 per cent respectively. A glance at table 4.3, shows that the proportion of women who took mathematics had changed very little from the pre-war period by the 1920s, although the two sets of data are not directly comparable, the former being examination results, and the latter students. The implication is that in this subject area women's opportunities neither improved nor declined. The percentage of women studying chemistry grew however from 6.7 per cent before the First World War to 11.2 per cent during the 1920s, signifying that women's potential areas of study were broadening. This was probably aided by the growing possibility of practicing professions such as pharmacy by the early twentieth century. Most women who did so gained positions in hospitals or as assistants to dispensers. Fewer had businesses of their own due to lack of capital and financial backing.<sup>44</sup> In addition, chemistry and other science subjects offered women qualifications which enabled them to teach as subject specialists at

secondary level. In physics, women's proportional participation increased from a small 4.3 per cent before the war to 24.4 per cent during the 1920s, a substantial change. Although these science subjects were not the areas of curriculum in which women participated most significantly, their involvement was growing, highlighting that opportunities were broadening, and that employment prospects in such areas were increasing.

In the majority of applied science subjects such as engineering, motor body building and architecture however, women's participation remained minimal during the 1920s as it did in City and Guilds' courses, and seems to have been linked directly to the availability of employment prospects after studying, and also, to an extent, to conventional beliefs about 'suitable' employment for women. These attitudes did not, however, prevent women from participating to a significant degree in commerce, journalism and photography, none of which were occupations deemed to be particularly 'feminine'. One more set of scientific qualifications was offered at the polytechnic, the higher national certificates, which should be considered before any final comments on female participation in educational classes are made.

### **HIGHER NATIONAL CERTIFICATES, EXAMINATION RESULTS**

Table 9.11 presents information on higher national certificates but not on higher national diplomas, on the grounds that the former presented the highest level of achievement that could be gained by evening study over five years, an alternative being the ordinary national certificate awarded to successful candidates after three years of study. Higher national diplomas were offered at the polytechnic, but were awarded to full time students only. Higher national certificates were offered in the fields of mechanical, gas and electrical engineering and chemistry.



**Table 9.11 HIGHER NATIONAL CERTIFICATE EXAMINATION RESULTS, 1918-1930, (FINALISTS ONLY)**

Year	Total passes	Female passes	Initials	Female passes as % of known males and females
1921-22	5	0	0	0
1922-23	7	0	0	0
1923-24	11	0	10	N/A
1924-25	13	0	1	0
1925-26	19	0	6	0
1926-27	25	0	12	0
1927-28	30	1	7	4.3
1928-29	30	0	14	0
1929-30	<u>25</u>	<u>0</u>	<u>16</u>	<u>N/A</u>
Average	18	0.1	7	1.0

**Source:** Polytechnic Magazines, 1921-1930, University of Westminster archives.

Higher national certificates were a very specialised and advanced form of study, hence the small numbers of finalists over the nine years shown in table 9.11 are not surprising. The most striking observation is that over the whole period, and across four certificate courses, only one female name appeared in the academic year 1927-28. However, it is possible that women were under-represented by the recording methods. Although there were forty three named males and only one female in electrical engineering, firstly it is significant that a woman achieved a high level qualification in a technical subject, supporting the argument that electrical engineering did offer some new opportunities to skilled women in the interwar years, and secondly, fourteen successful candidates were not specified by sex. However, it has already been shown that the details of electrical engineering students only appeared in the course registers for two years, and that a very small number of women participated. It is not possible to establish from the registers, the qualifications for which particular students were studying, they are simply listed as 'students of engineering' for example, who may have been preparing for a number of different examinations. Thus the course registers cannot offer any new insights into women's possible participation in higher national certificates, because all students are grouped together.

This was not a problem for the certificate in mechanical engineering where only six students were unnamed and the other forty seven were all named males, and therefore it is unlikely that female participation was significant. However in chemistry and gas engineering the ambiguity was much greater. Only four named males appeared in each set of data but the number of initials was much larger in both cases, thirteen in chemistry and thirty three in gas engineering. The course registers did not hold any information on gas engineering students, but a whole volume was dedicated to chemistry. The findings from this source have already been presented in table 9.10. Unfortunately, because the register simply provided a list of students of chemistry, and not an indication of the qualifications that each student was preparing for, it was not possible to say whether any of the women who appeared in this table as chemistry students, progressed to gain higher national certificates. It can only be speculated that this might have been the case. The finding that women's participation in applied science subjects was minimal, and that in pure science subjects such as mathematics, chemistry and physics it was larger, but still less significant than other areas of curriculum, suggests that the contention made earlier that women probably comprised a higher proportion of total students than is indicated by the membership figures in table 9.1, was a little premature. However, although the focus of this study is on scientific, technical and vocational subjects, it should not be forgotten that there were other areas of the curriculum in which women participated.

## **REMAINING SUBJECT AREAS, EXAMINATION RESULTS**

The Polytechnic Magazines were scrutinised, with the aim of locating any subjects which were not originally considered practical or technical, but which possibly housed a significant level of female students. A number of courses were located and the results have been aggregated over the period 1918-30, and presented in table 9.12.

**Table 9.12 EXAMINATION RESULTS IN REMAINING SUBJECT AREAS,  
1918-1930**

	Total passes	Female passes	Initials	Female passes as % of known males and females
School of speech training	69	55	4	84.6
Board of Education examinations in art	135	89	13	72.9
School of music	107	59	32	78.7
University of London extension lectures				
a) Economics	892	206	0	23.1
b) Art	31	14	0	45.2

**Source:** Polytechnic Magazines, 1918-1930, University of Westminster archives.

It is apparent from table 9.12 that women's proportional participation was greatest in arts subjects, a trend which has also been observed at U.C.L. Although these subjects might appear rather genteel and non-vocational, it is significant that women comprised around three quarters of all students in art, music and speech training. Both music and speech training in fact had vocational applications. The polytechnic magazine for 1922 stated:

'The openings for teachers of speech training and expression in the future are likely to be greatly increased in view of the report of the departmental committee appointed by the Board of Education to enquire into the teaching of English in England'.<sup>45</sup>

and a second report of the magazine stated:

'Several students, among others Miss Sylvia Newton, have started during the year as teachers of elocution, and are doing excellent work'.<sup>46</sup>

In fact, speech training could involve a scientific study of the throat and larynx and was not only of use in elocution teaching and the dramatic arts, but in the therapy of people with speech problems. Numerically these courses were less significant than the examinations in

art, which proved a popular area of study for women. Some may have chosen these courses because they were pursuing hobbies, alternatively, many looked upon arts qualifications as a good source of training for employment. From 1924, industrial design became a popular female choice, with the first woman, Mary E Webb qualifying in this year. In addition, an inspector's report of the polytechnic in 1929 stated that the design department within the school of art was in close touch with the art industries. Many of the polytechnic's students, it claimed, left the college to become furniture designers, illustrators and advertisers.<sup>47</sup> It is not correct then, to consider arts subjects as invariably non-vocational and non practical. In fact some of the more directly vocational qualifications were in arts subjects rather than pure sciences.

Art lectures, in contrast, were less popular amongst women than men, with forty five per cent of total students being female. This is interesting given that the subjects covered were more theoretical and historical than the Board of Education Examinations which were practical. Women, it seems, were more likely to study applied art than men. Finally, women comprised a smaller percentage of the total in economics lectures, twenty three per cent, but their numerical presence was significant. More women studied economics than the specially designed courses such as cookery and dressmaking, which implies that the polytechnic was not simply reinforcing labour force and social norms. In addition more women seem to have studied economics than the commercial subjects, shown in table 9.4, although the latter were heavily obscured by a large number of initials, and thus the number of women who studied may have been higher, as shown by the example of journalism. The high number of female university extension students however, suggests that the polytechnic was by no means catering for working class and lower middle class students alone, which prompts comment on the social composition of polytechnic members. Compared to the large

numbers of women who studied languages and photography however, economics was less significant than might originally appear to have been the case.

It is extremely difficult to establish definitively the female level of participation in educational classes during the 1920s. The finding that women comprised an exceptionally high proportion of total students in speech, art and music counteracts their smaller participation in the applied sciences to an extent, and suggests that on balance women's involvement in education at the polytechnic was probably higher than suggested in table 9.1. It is noteworthy that women participated in such a wide range of subjects, such as pure science, commerce, photography and technical art, a feature which the initial data did not suggest, and that in many areas their level of involvement increased on pre-war rates. In addition, many of these subjects were not particularly 'traditional'. For working class women however, the availability of training for skilled and technical trades was still minimal during the 1920s, and it appears that this group of women missed out more than other women at the polytechnic. The following section considers the social composition of polytechnic members, with the aim of ascertaining whether the institution catered for working class people, or whether study had become much more focused on the lower middle classes.

One way of establishing the backgrounds of those at the polytechnic was to consult the candidate books which gave details of the occupations of polytechnic members. The results must be treated cautiously however, because, as already mentioned, a number of polytechnic members were not attending educational classes. However, the candidate books give a snapshot of the types of young people who were attracted to Regent Street, whether for social or educational reasons, and thus are a useful source. A small sample of twenty five males and twenty five females was taken from the candidate books for 1929. This year was chosen as that in which female participation, at 28.4 per cent of the total, was at its closest to the

average female proportion for the whole period 1918-1930, 28.5 per cent. As for the pre-First World War study, the twenty five were chosen by taking the first and last name in every month of the year, and three for the month of September when enrolments were at their peak.

Unlike the pre-war study, this sample showed that all twenty five women were occupied whilst at the polytechnic, twenty in paid employment, and five students. Before the war, four were registered as non-occupied. Interestingly, the number of women who were registered as 'students' was much higher in 1929 than in 1907 when there was only one. This implies that women's desire to enter full-time education became more accepted after the war, and that opportunities for women increased, a trend which was borne out by the growth of female participation as students at U.C.L. after 1918. Alternatively, women's classification of themselves as 'students' was possibly a form of disguised unemployment, given the poor economic climate of the 1920s, and the preference to avoid describing oneself as 'unemployed'. If this were the case, then the numbers who were in paid employment and unoccupied before and after the war, were identical. Interestingly however, only three of the male sample were students, the remaining twenty two being in various kinds of employment. The sample is really too small to draw any concrete conclusions, but it might be suggested that women made proportionately greater strides in full-time education than men during the 1920s. Chapter ten will explore this more fully. The number of employed males was slightly higher than the number of females, but not significantly so.

The fact that eighty per cent of female polytechnic members claimed to be employed in 1929, suggests that their main motivation for study was vocational, and that their social status remained very different to those women of U.C.L., who were essentially from middle-class backgrounds. Whilst these women often chose to take employment after graduating, they

were not all under economic pressure to do so, whereas in contrast women who studied at the polytechnic more probably expected to work, and found educational classes a means of improving their employment prospects. The difference between the status of women at U.C.L. and the polytechnic can further be exemplified by considering the cost of an education at the polytechnic, and offering some comparison with U.C.L.. Table 9.13 gives details of various full-time and evening classes offered at the polytechnic between 1918 and 1930.

The rise in prices between 1919 and 1921 was significant, and universal across all courses. It was also in keeping with the general rise in prices after 1919 due to the inflationary pressures of the war. Table 8.2 showed that most courses at U.C.L. also increased their fees between 1920 and 1921. Indeed further reference to table 8.2 is interesting, because it allows the cost of study at U.C.L. and the polytechnic to be compared. The BA in architecture and the BSc in engineering at U.C.L., were both priced at 120 guineas for three sessions in 1918-19 and rose to 168 guineas in 1920-21. Thus, one year of study cost forty guineas in 1918 and fifty six guineas by 1920. In contrast, the full-time course in architecture, building and surveying at the polytechnic cost only ten guineas in 1918, and eighteen pounds by 1921, whereas engineering charged eighteen guineas in 1918 and twenty one guineas by 1921. The difference is significant. Full-time students at the polytechnic were paying in the region of one third of the fees paid by undergraduates of U.C.L. Although the standard of education was not directly comparable, studying full-time at the polytechnic was an option available to a much wider section of the population than enrolling at U.C.L., which was restricted to those of upper middle class status unless a scholarship or grant could be won.

**Table 9.13 COST OF SELECTED POLYTECHNIC COURSES, 1918-1930  
(PER ANNUM)**

Course	1918-19	1921-22	1924-25	1926-27	1929-30
<b>Full-time</b>					
Architecture, building and surveying	£10 10s	£18	£18	£18	£18
Engineering	£18	£22 1s	£22 1s	£22 1s	£22 1s
<b>Part-time</b>					
Chemistry	7s 6d	£1	£1	£1	£1
Mathematics	7s 6d	£1	£1	£1	£1
Photography (negatives and prints)	£1 1s	£1 10s	£1 10s	£1 10s	£1 10s
Commercial training	£1 1s	£1 10s	£1 10s	£1 10s	£1 10s

**Source:** Polytechnic prospectuses, 1918-1930, University of Westminster archives.

John Stevenson has suggested that: 'for most of the interwar years, the average industrial wage for men and boys remained under £3 per week',<sup>48</sup> which amounted to approximately £156 per annum. It seems unlikely that industrial wage earners were able to afford a full-time education at the polytechnic for their sons and daughters, which would have taken up approximately one seventh of their income. Given that women's wages, on average, were less than half that of men,<sup>49</sup> few women would have been able to save enough to support themselves, or their daughters as full-time students. Although polytechnic fees were much lower than those at U.C.L., it remains true that few working class men and women would have attended the polytechnic day schools. According to Stevenson's calculations, average weekly salaried earnings were in the region of four pounds, which amounted to just over £200 per annum.<sup>50</sup> It is conceivable that this group may have afforded daytime education for their offspring, although at about ten per cent of family income, finances would have been a little tight. As for the pre-war period it seems that full-time study was very much the preserve of white collar families of lower middle-class status and above.



Evening courses, however, were much more affordable, at anything between one pound and £1 10s per annum. Even women working in domestic service, and earning as little as £52 a year could afford to enrol for polytechnic courses if they chose. For an average industrial wage earner, such courses cost less than one per cent of annual income. Compared to the pre-First World War period, it seems that the real cost of studying polytechnic evening classes had fallen (see table 4.6). In addition, the L.C.C., in 1921 agreed that the heads of all London evening institutes could 'at their discretion' reduce fees for financially deprived students by fifty to seventy five per cent, as long as they were resident in the administrative county.<sup>51</sup> This was designed partly to offset the large fee increases of 1921, but meant that in theory, educational provision was open to a wider spectrum of the working population during the 1920s, and was not socially exclusive. No record was taken of how often this policy was put into practice however.

In economic terms, the polytechnic was affordable to most working-class people. It remains to be seen however, whether working-class men and women comprised a significant proportion of the polytechnic membership. Chapter ten explores in more detail the social composition of polytechnic students and pays particular attention to the extent to which these students used the polytechnic as a means of strengthening their current employment positions, or whether they aimed to acquire new skills and qualifications to alter their employment prospects. The first part of this chapter however, considers the activities of women who had graduated in science subjects from U.C.L. during the 1920s.

## NOTES TO CHAPTER NINE

1. LCC/ED/HFE/5/128, small pamphlet entitled England's greatest assets, p. 9, Greater London Record Office.
2. LCC/ED/HFE/5/236, p. 56, Greater London Record Office.
3. E M Wood (1965), p. 121.
4. LCC/ED/HFE/5/236, p. 1, Greater London Record Office.
5. E M Wood op.cit, p. 124.
6. Ibid, p. 121; Polytechnic prospectus 1917-18, p. 51 and pp. 53-5, and polytechnic prospectus 1918-19, pp. 3-4, University of Westminster Archives.
7. Polytechnic prospectus, 1918-29, course numbers 37,11,19 and 21, University of Westminster Archives.
8. E M Wood, op.cit, p. 124; LCC/ED/HFE/5/128, programme for 1927, p. 3, Greater London Record Office.
9. Polytechnic prospectus, 1918-19, first page after the index, University of Westminster Archives.
10. LCC/ED/HFE/5/128, small pamphlet, op.cit, p. 9, Greater London Record Office.
11. Polytechnic prospectus, 1930-31, p.56 cover iii, University of Westminster Archives.
12. N A Ferguson (1975), p. 55 and pp. 57-8.
13. Examples of City and Guilds examinations in which women did not participate are: road carriage building, gas supply, builders quantities, lead work, masonry, plumbing and woodwork.
14. See for example, polytechnic prospectus 1928-29, course number 37, tailor's cutting, number 11, woodwork, number 19, gas engineering and number 21, oils, fats and waxes, University of Westminster Archives.
15. See for example M Berg (1985), p.152.
16. R E Catterall (1979), pp. 253-4.
17. W J Reader (1987), p. 160.
18. D C Coleman (1969), p. 430.
19. M Glucksmann (1990), p. 220.
20. Ibid, p. 222.
21. M Sanderson (1972), p. 266.

22. A number of the course registers are missing for various years of this study, and some courses mentioned in the Polytechnic Magazines are not covered by the course registers.
23. Polytechnic prospectuses, 1922-3, pp. 20-3; 1923-24, p. 29 and 1924-25, p. 29, University of Westminster Archives.
24. See quote by Mr T Clarke in E Settle (1973), pp. 21-2.
25. Examples of successful female journalists are Vera Brittain, Ellen Wilkinson and Elizabeth Craig.
26. C Davies (1988) p. 47 and pp. 56-7; P Williams (1973), p. 80.
27. E Morley (1914), pp. 229-30.
28. Central Bureau for the Employment of Women (Undated, BL catalogue suggests 1910), pp. 101-2.
29. Englishwoman's Yearbook (1890), p. 121.
30. City and Guilds examination results for photography, 1895-1904, University of Westminster Archives.
31. M Pritchard (1987), p. 214.
32. The Girl's Realm (1901), pp. 981-4.
33. Ibid, p. 983.
34. Polytechnic prospectus, 1922-23 course number 51, University of Westminster Archives.
35. Central Bureau for the Employment of Women, op cit, p. 69.
36. Polytechnic prospectus, 1918-19, first page after the index, University of Westminster Archives.
37. V Wigfall (1980), p. 51.
38. Central Bureau for the Employment of Women, op cit, p. 40.
39. G Watson (1988), pp. 129-30.
40. W J Reader (1987), p. 160.
41. M Sanderson (1972), p. 322 and p. 336.
42. J Lewis (1984), p. 149; M Glucksmann (1990), p. 57.
43. R E Catterall, op.cit, pp. 253-4.
44. Central Bureau for the Employment of Women, op cit, pp. 132-5.
45. Polytechnic magazine, 1922, p. 35, University of Westminster Archives.

46. Ibid, p. 36.
47. LCC/ED/HFE/236, p. 31, Greater London Record Office.
48. J Stevenson (1984), p.120.
49. Ibid.
50. Ibid, p. 122.
51. LCC, Education Committee Minutes (1921), p. 443, Greater London Record Office.

Recent research has shown that during the twentieth century, a number of women achieved high profile work as scientists. However, as Lesley Hall has pointed out, such women are difficult to trace, and many have been 'omitted from history'. Her own area of research is women in medicine and biomedical science and she claims that there are many who have not yet had their stories told.<sup>1</sup> This situation has of course created an illusion that women rarely participated in such fields. Our limited knowledge of these women results essentially from poor documentation, as the information gained from U.C.L. will show. It is also due to a tendency of researchers to look only at successes in 'hard science' such as prestigious employment posts and publications which women could not always gain. Many women did less prestigious, but valuable and pioneering work in poor law hospitals, or carried out research for Royal Commissions, but the papers which they published, or their notes are often placed with the records of their male work colleagues or husbands.<sup>2</sup>

In fact, women did succeed as high level scientists. Hall's study demonstrates that Joan Malleon, for example was one of a pioneering group of doctors concerned with 'sexual reform' who was involved in setting up the Family Planning Association and training medical students at U.C.H. Medical School, and Honor Bridget Fell was the director of the Strangeway's research laboratory in Cambridge from 1926-1970, a highly prestigious position.<sup>3</sup> There may be other such women who have simply not been traced. The following section considers the later activities of U.C.L.'s female science graduates and aims to establish whether other highly educated women were able to break into impressive and even 'non-traditional' careers.

## **FEMALE SCIENCE GRADUATES OF U.C.L.**

Choosing female science graduates as a group for research ensured continuity with the women investigated in chapter five. It was also a 'manageable' sample of the women who studied at U.C.L. between 1918 and 1930. It was not sufficient to define 'science graduates' as those only who had obtained a BSc however. As mentioned in chapter eight, a number of arts degrees were in subjects which might be considered scientific or social scientific. The women included in this study are thus all those with a BSc in a pure or applied science and engineering, and in addition those who gained the BA in mathematics. The BSc degrees in economics, anthropology and geography in contrast, have been excluded because they were social science subjects, as was the BA in geography. Finally, whilst the BSc in psychology was included, the BA in the same subject was not. This was because the BSc degree was more clinical and applied than the BA, which was essentially a 'social psychology' degree. The categories used by U.C.L. to define 'arts' and 'science' subjects have thus been redefined for the purposes of this study, to ensure that all women who gained any form of scientific education are included.

The methodology outlined above, provides a total number of 285 female science graduates for the period 1918-1930, a large number of women to attempt to follow up. Because U.C.L.'s student records were not designed systematically to record later occupations of ex-students, there is no way of knowing which graduates have a record of their later careers and which do not, without scrutinising all the files. Thus a sample approach was not suitable. Every student of the college should have had an index card with brief details such as name, date of birth, address and occasionally information regarding academic or other success post graduation. These cards provided a reference number which led to a student file. Twenty one of the 285 women in this study had no index card however, and therefore no student

record file. In addition, a further six had missing student record files, even though they did have index cards in their names. These discrepancies reduced the number of observations to 258. Furthermore, five other graduates appeared in more than one academic year. This was because they had initially gained a University of London BSc through U.C.L., and then the following year had been awarded a BSc special degree, which was a degree set and marked entirely by U.C.L. professors,<sup>4</sup> in the same subject, presumably by completing one or two more courses. Such women cannot be counted twice, because they had not read for two separate degrees. Thus, the number under observation was reduced to 253.

The first stage of the research involved looking up the index cards for all these female graduates. Although they were not designed to give any information about the lives of graduates after they left U.C.L., the index cards actually proved a valuable source. 154 of the cards gave some kind of evidence of post-graduate qualifications, careers and other achievements, which meant that without even looking at the student record files, over sixty per cent of the women had some kind of record. On a few occasions, the cards also gave references to scientific directories and the Civil Service List, suggesting that more information regarding that graduate could be discovered externally. These directories were checked and the findings added to appendix C. The student files also provided a significant amount of information, much of it the same as that provided on the index cards, although there were sixty one occasions where the files gave additional or completely new information. Twenty of the files, had details of graduates where the index cards had offered no information at all. Also, U.C.L.'s annual reports gave lists of higher degrees awarded to post-graduate students between 1920 and 1939. Some of those who gained higher qualifications in this period did not graduate from U.C.L. initially, but from other universities, and thus are not included in the study of 253 science graduates. However, by checking each female name that appeared in the annual reports against our list of female

science graduates, it was possible to check firstly, whether the information given by the index cards and student records was correct, and secondly whether any graduates gained higher degrees but for some reason were omitted from the student records. No errors were located. However, three women were found to have higher qualifications not mentioned in the files and another had an additional higher degree to that suggested by the student records. The total number of graduates with evidence of post-graduate achievements rose to 177 as a result of this exercise, accounting for seventy per cent of the total.

It is particularly surprising that such information existed for seventy per cent of graduates given the unreliability of the student record files. The main drawback of these records was that they were designed only to provide an account of student activities whilst at U.C.L. If a graduate re-entered U.C.L. or the University of London to study or teach, there was a good possibility that this information would be documented. If the graduate gained higher qualifications elsewhere or secured external employment, there was no guarantee that the details would find their way to U.C.L.'s records which means that the level of female post-graduate activity is underestimated. It seems, however, that during the 1920s more information was recorded than prior to the First World War, with a number of employment details being documented. The employment profiles exist mainly because former students sent their own career histories to the college, references were found in the Times and attached to the record files or, on a few occasions, a graduate had secured a job prior to leaving U.C.L., and thus contact was not lost with the student before employment details could be gleaned. Few of these discoveries were the result of a systematic attempt by the college to maintain contact with former students. The result is that there are very few occasions where the full career history of a female graduate can be traced. Rather, we have sporadic information, giving details of the achievements of women in certain years, rather than their complete career progressions.



A major source of information resulted from the practice of Local Education Authorities during the 1940s of sending letters to universities seeking proof that a teacher working for their authority had gained their degree at that college. U.C.L. received a number of these letters, which were then attached to the relevant student record files, providing evidence that these graduates had become teachers. It was very rare for U.C.L. to have documentation of its own stating that these women had gone into the teaching profession. This strongly suggests that the record files, whilst not 'unreliable' certainly under-record the later careers of female graduates. Generally the researcher has to rely on external information to gain a broader picture. A good example of this under-recording of achievement is that the record file for Hugh Hale Bellot gave no indication of his having participated in any post-graduate activities, and yet he wrote a history of U.C.L.<sup>5</sup> The existence of some form of documentation for seventy per cent of female science graduates is therefore encouraging. Equally surprising was the fact that U.C.L.'s college calendars, which provided lists of academic staff, and were consulted for the years 1918-1940, gave evidence of ten women who had graduated from U.C.L. and then gained staff appointments at the college, but who had no such information in their record files. The calendars proved a valuable source of information, whilst also emphasising the tendency of the student records to minimise the successes of students.

The cumulative index of Who Was Who,<sup>6</sup> which covers the period 1897-1980, was also scrutinised to establish whether any of the 253 female graduates were listed, and to broaden the information gleaned from U.C.L.'s records. No entries were found, which is rather surprising given the high achievements of some of these women, as demonstrated in appendix C. It seems that unless a woman actually pioneered a new field, she did not gain a listing in Who Was Who however high profile her awards or employment were. It is also the case that women were often excluded from such reference books. The same process was carried

out using a series of women's only directories and dictionaries<sup>7</sup> but again, none of the female graduates were listed. This was rather disappointing. However other directories, of a more specialist nature were of greater use, for example a Who's Who in British Science, published in 1953 by Leonard Hill, Shaw's Women's Who's Who and Hutchinson's Women's Who's Who, both published in the 1930s, and also the Directory of Women Teachers published by the Year Book Press in 1927. The latter did not capture all the female graduates because some were still studying up to 1930, and where it did, the details provided were normally only of a first post, and therefore did not give an indication of career progression. Nevertheless, all gave an important insight into the post-graduate activities of some of these women, which expanded upon the information available in the student record files.

The total number of graduates who could be traced as a result of all these exercises was 187, or just under seventy four per cent of the total group. Three main types of activity can be highlighted from this data: further qualifications, employment, and awards or fellowships. The largest single group was 'further qualifications', with 147 graduates, just under seventy nine per cent of the total, gaining some form of additional qualification. This is a remarkable figure, especially given that women who studied outside London were not always recorded. Ninety seven, or fifty two per cent, had details of later occupations. Again, given the sporadic nature of the recording techniques, this figure is very significant. It is even more impressive when placed in the context of existing historical research which suggests that there was a large disparity between the number of women entering professions in the 1920s, and the number of female graduates from universities. Eschbach shows that law, medicine and the ministry often requested higher degrees during the early twentieth century as a qualification for entry to their various societies. The implication is that this deterred women.<sup>8</sup> The extremely large numbers of U.C.L's female graduates who obtained higher

qualifications, however, suggest that women accepted the challenge, and that there is no reason to suppose they were not qualified enough to embark on professional careers although they were frequently prevented from doing so.

A study carried out by Judith Hubback in 1957 looked at the career patterns of women who graduated from British universities between 1930 and 1953 and were married. She found that only one fifth carried out full-time paid employment, the remainder claiming to be full-time housewives, or part-time workers. Twenty three per cent stated that their career ended on marriage whilst twenty six per cent left work on the birth of their first child, although only two per cent claimed to have been affected by the marriage bar.<sup>9</sup> Hubback's research was carried out for a later period than this study, amidst a climate of gradual acceptance of married women in professional life. Thus, one might expect that women who graduated during the 1920s were more likely to be affected by the problems of combining work and marriage than a later generation of university women. That fifty two per cent of the women in this study were traced as having entered various kinds of employment is thus surprising, and signifies that such women in order to follow successful careers, perhaps remained single. The high proportion of women with details of later occupations is even more surprising when it is considered, as Butcher points out, that women rarely had female role models to aspire to in the professions, especially medicine, law and university lecturing, and thus that the image of such occupations being impossible to enter was strongly reinforced.<sup>10</sup>

At U.C.L. between 1918 and 1930 just under sixteen per cent of the academic staff were female on average, although their participation grew from 11.4 per cent in 1918 to just over eighteen per cent by 1930, signifying that a return of men from the War did not jeopardize their opportunities.<sup>11</sup> This rate of participation did not match women's proportional significance as students, but it was nevertheless significant, and perhaps higher than the

national average.<sup>12</sup> Women academics also clustered in certain faculties. At U.C.L. they accounted for just over seventeen per cent of staff in the faculty of arts and nearly twenty one per cent in the faculty of science. This high proportion of female science staff is noteworthy and perhaps surprising. It is partly because U.C.L. during the 1920s employed three very distinguished botanists, Marie Stopes, Winifred Smith and Ethel Thomas, all in the position of lecturer, and also because Karl Pearson, the eugenicist, appointed significant numbers of female assistants. Admittedly, his reason for doing so, was because women were cheaper to employ than men, but the effect was a high proportion of female science staff at U.C.L., which Perrone suggests was above average.<sup>13</sup> In the faculty of engineering women accounted for barely four per cent and in medicine, just over thirteen per cent of staff. It is noticeable that the faculties in which women were most significant as students were those which also had high female staffing levels, so perhaps the presence of successful women academics encouraged younger women to study, and this may explain why U.C.L. had such a significant proportion of science, and in contrast a small number of engineering students.

Alternatively, the higher proportion of science and arts staff was probably a reflection of the success of U.C.L.'s female students in these areas. Many of these women graduated and then gained academic posts with the college as the following discussion will show. The effect of these relatively high levels of female staffing, was that women graduates of U.C.L. had role models to inspire them and thus the recognition that university teaching was not an entirely closed profession. The majority of these female academics however were demonstrators and research assistants, only nineteen per cent were lecturers, readers or assistant professors, so it is the case that the majority found themselves in the lower branches of academia, although across the years 1918-1930, the proportion of women lecturers to assistants grew, and more began to secure posts as senior lecturers, readers and even assistant professors. These proved an important source of inspiration to female graduates.

In spite of this, a number of the women who achieved higher qualifications had no record of a later career. It is far more likely that this was due to poor recording techniques than that it was an expression of low female desire to work, especially given that many of these qualifications, medicine and education for example, were vocationally orientated. In addition, the Englishwoman's Yearbook, which gave details of a number of U.C.L's female graduates from before 1914 who had become lecturers, was no longer produced in the interwar period. Although the Directory of Women Teachers provided details of women who worked in both secondary and higher education, it was last published in 1927 and thus did not cover some of the science graduates from this study. In addition it captured most post-war graduates at a very early point in their careers, and thus did not document any who began their careers as schoolteachers and later moved on to higher education establishments. There were cases of such career progressions before the First World War. Theodora Pranker for example began her career as a secondary school teacher in 1907 but at a later date became a lecturer at the University of Reading.<sup>14</sup> The number of women who went into academia is probably underestimated in this study and should not be compared too closely with the pre-war figures.

Finally thirty six women, or nineteen per cent, gained fellowships or membership of professional bodies or were offered awards. All of these women, except three, had gained higher qualifications or secured some form of employment, and in addition achieved a high level award. Thus, these were extremely successful and demonstrated that women could and did achieve high status lives. That nineteen per cent of the total fell within this category is highly significant. Indeed, it is surprising that so many women were involved in post graduate activity, in view of the dearth of historiography suggesting female achievements of this order. Articles by Elizabeth Edwards, Joyce Antler and James Hammerton demonstrate that the dominant belief of the late nineteenth and early twentieth centuries was that education

served to make women genteel, intelligent and good companions or civilised homemakers, rather than competitive career women.<sup>15</sup> A number of U.C.L's female science graduates for whom we have no data may well have chosen this path, but a large number engaged in employment, or gained further qualifications, almost entirely in scientific and vocational subjects, quite probably in order to increase their chances of gaining careers, in a highly competitive and unfavourable environment. In fact, the Victorian and Edwardian image of the university woman and her dilettante interests was somewhat antiquated by the 1920s. Margaret Tuke, writing in 1928 suggested that women who attended university after the First World War were far more likely than older generations of university women, to be seeking qualifications for vocational reasons. They were less likely to be from leisured backgrounds seeking an education for its own sake, and more commonly of lower middle-class status, supported by a grant and training to be teachers. Tuke bemoaned this development, claiming that the university had become a 'training ground for teachers' and that fifty to seventy five per cent of university women later embarked upon a teaching career, rather than being interested in education primarily as an intellectual experience.<sup>16</sup>

The following table indicates the types of post-graduate qualifications awarded to female science graduates, and therefore offers insight into the contention that women in the 1920s were more vocationally minded than their forerunners. Although the number of graduates who gained further qualifications was 147, the number of qualifications achieved was slightly higher. This is because some graduates held more than one additional degree or diploma.

A number of significant points arise from table 10.1. Firstly, the number of qualifications gained, and the level of achievement reached is an indication of motivation, perseverance and ability on the part of the women who studied for them. Secondly, the university teachers diploma, which qualified women to become schoolteachers appears to have been

outstandingly popular. This suggests that Tuke's assessment was correct and that the traditional career of teaching was indeed favoured by women. The diploma was offered at the University of London, helping to explain why it was recorded so frequently whereas qualifications gained from alternative institutions may not have been documented. If all the different types of higher degrees such as doctorates and masters qualifications are combined, the total number is sixty nine, not far short of the seventy eight teaching diplomas that were awarded. Thus higher degrees, which took two to three years to complete, were almost as popular as one year teaching diplomas. The large number of PhDs that were awarded is indicative of a high level of success amongst female graduates of U.C.L. In addition, six graduates were recorded as having enrolled for PhDs and a further seven for MScs, but no information as to their success was given. Two graduates, numbered 100 and 101 in appendix C enrolled for their PhDs in 1929, but sadly died in 1931 before they were able to complete. It is also reasonable to assume that a number of women for whom we have no information, studied for diplomas and higher degrees at other institutions.

**Table 10.1 POST-GRADUATE QUALIFICATIONS AWARDED TO FEMALE SCIENCE GRADUATES OF U.C.L. FROM 1918**

University teachers diploma (Ped)	78
Master of Science (MSc)	28
Doctor of Philosophy (PhD)	27
Bachelor of Medicine/Surgery (MB, BS or B.Ch)	12
Doctor of Science (DSc)	5
Doctor of Medicine (MD)	4
Master of Arts (MA)	3
Diploma of Public Health (DPH)	2
Master of Engineering (MSc eng)	1
Diploma in Child Health (DCH)	1
Diploma in medical radiology and electrology (DMRE)	1
Doctor of paediatric medicine (DPM)	1
Post graduate diploma (PG Dip)	1
Diploma in Journalism (Dip Journalism)	1
Diploma in Librarianship (Dip Librarianship)	1
	<u>166</u>

**Source:** Index cards, student record files SR44 - SR306 and annual reports 1925-1935, U.C.L. Records Office.

At present, these figures look impressive, but need to be compared with male post-graduate qualifications to ascertain how significant female participation at higher degree level was. The task, however, of following up the names of all male science graduates in the student records would have been extremely time consuming, especially given that there were 584 men who graduated in science as opposed to 291 women. (This of course, is based on U.C.L.'s own definition of science, rather than that outlined in this chapter, which reduced the number of female science graduates to 285.) Thus it was necessary to attempt some other kind of comparison which allowed suitable generalisations to be made. The Annual Reports, housed in U.C.L.'s Records Office, provided annual lists of higher degrees awarded by U.C.L. By counting the number of men and women who gained doctorates and masters degrees during the decade 1925-1935, the majority of those who graduated from U.C.L. between 1918 and 1930, and then progressed to further study were captured.

One problem with this approach was that a number of science graduates from U.C.L. studied for higher degrees at other institutions, and therefore were not covered by this data. In contrast others who had been undergraduates elsewhere were able to study as postgraduates at U.C.L.. Table 10.2 shows that the annual reports recorded seventy six women with higher degrees between 1925 and 1935. The results of the study carried out with the student records were that sixty nine women had higher degrees. This study covered a longer time span, with one or two women gaining qualifications as late as the 1950s. Thus it seems that the annual reports contain a number of women who did not originally graduate from U.C.L., and suggest that more external students came to study for higher degrees at U.C.L. than the college lost its own students to other institutions. The difference between the two sets of results however, is minimal and thus can be ignored. A small number of students of Asian origin could not be established as either male or female, because their names were unisex, or because no-one of sufficient expertise could be found to define their sex. Thus these have



been placed in a separate 'unknown' category. The majority of those of Asian origin however were established as either male or female, and are included in the general figures.<sup>17</sup>

**Table 10.2 HIGHER DEGREES AWARDED BY U.C.L., 1925-1935.**

	Male	Female	Unknown
PhD Maths (arts)	1	1	-
MA Maths	8	1	-
PhD Science	185	25	7
DSc	63	7	2
MSc	176	40	4
DSc engineering	3	-	-
PhD engineering	2	1	-
MSc engineering	<u>18</u>	<u>1</u>	<u>-</u>
Total	456	76	13

**Source:** Annual reports, 1925-1935, U.C.L. Records Office.

Table 10.2 suggests that women were under-represented as higher degree students compared to men, accounting for only just over fourteen per cent of known males and females. However, it is unrealistic to expect women to have competed on an equal basis, when fewer women than men graduated with first degrees in science subjects, 291 women compared to 584 men. It is more realistic to consider female higher degrees as a percentage of female science graduates, and likewise for men as table 10.3 shows.

**Table 10.3 HIGHER SCIENCE DEGREES AWARDED BETWEEN 1925 AND 1935 COMPARED TO SCIENCE GRADUATES OF U.C.L. FROM 1918 TO 1930**

	Science graduates	Higher degrees	% of graduates gaining higher degrees
Male	584	456	78
Female	291	76	26

**Source:** College calendars, 1918-1930 and annual reports, 1925-1935, U.C.L. Records Office.

The difference between male and female participation at higher degree level is still significant, but although the male figure is exceptionally large female participation cannot be described as low. Over one quarter of female science graduates progressed to gain higher degrees, by no means an insignificant level of achievement. However, male progression from first to higher degrees was astounding, with seventy eight per cent of men following this route. It may be, that a number of these higher degrees were awarded to students who had been undergraduates at other institutions, and thus that technically, higher degrees were not gained by seventy eight per cent of the original male graduate group. Nevertheless, men did study for higher science degrees to a greater numerical and proportional extent than women. This should not detract from the important finding that twenty six per cent of female science graduates successfully gained doctorates and masters degrees demonstrating high levels of aptitude and commitment.

Higher degrees were not the only further qualifications gained by women. The largest number obtained the University of London Teacher's Diploma. Students could study for this at the London Day Training College, which became the Institute of Education in 1932, and also at Furzedown, Goldsmiths, Maria Grey and St Mary's colleges in London. The diploma offered at the Day Training College was a: 'one year, full-time professional course available only for graduates, few in number, who came at their own expense to train for posts in secondary schools'.<sup>18</sup> Thus, the training was rigorous and professional, and it is interesting to establish the proportions of women and men who studied for these diplomas. The Institute of Education archives had copies of examination results from 1927 to 1933 for students of the teacher's diploma at all the colleges named above. The results are given in table 10.4.

**Table 10.4 EXAMINATION RESULTS OF THE UNIVERSITY TEACHER'S DIPLOMA 1927 - 1933**

	<b>Male pass</b>	<b>Female pass</b>	<b>Male fail</b>	<b>Female fail</b>	<b>Female passes as % of total passes</b>
1927	124	201	No data	No data	61.8
1928	116	205	6	5	63.8
1929	106	209	10	2	66.3
1930	121	235	9	2	66.0
1931	159	251	9	5	61.2
1932	172	226	4	6	56.8
1933	144	255	8	4	63.9

**Source:** Teacher's Diploma, examination results, 1927-33, Institute of Education archives.

In every year between 1927 and 1933 women comprised a significant majority of students peaking at 66.3 per cent in 1929, and on average were less likely to fail their examinations than men. Thus it appears that female teachers were better qualified than their male counterparts. These women were all training to be secondary rather than elementary teachers, probably attracted by the higher salaries, the growth of girls' secondary schools after 1918, and the ability to specialise in a particular subject. It is probable, on the basis of the figures presented in table 10.4, that the number of men who gained the 'Ped' after graduating from U.C.L. was lower than the number of women who achieved this qualification shown in table 10.1, and thus that this was an area in which women came to dominate.

In addition to higher degrees and teaching qualifications, medical training was popular as a female post-graduate qualification through the University of London. University College Hospital (U.C.H.) imposed a quota on the number of women who could carry out clinical placements during the 1920s, and thus it was difficult for women to graduate in medicine from U.C.L. itself. The women affected presumably qualified with BScs from U.C.L. to

aid their entrance to other medical schools at a later date. In addition, four women gained specialist medical diplomas and a further five, medical doctorates. All of these women had previously acquired general medical degrees, and then proceeded to gain professional qualifications in specific areas. Table 10.1 thus conveys a high level of success amongst U.C.L.'s female graduates. The vast majority of their qualifications were directly vocational, which complements the belief that the number of female graduates with a record of later employment is underestimated. A large number of the women who obtained the vocational qualifications described had no record of later employment in their files.

The University Teacher's Diploma, for example, was obtained by seventy eight women, as table 10.1 shows. Fifty one of these however, had no details of a later occupation. This is unlikely to be an expression of a lack of female demand for remunerative employment given the vocational nature of their diplomas. In fact after 1928 U.C.L. introduced a standard form which enquired as to the 'desired employment' of its students. Replies were attached to the student files. Seventeen of the graduates in our group filled out such a form, and not one stated a preference for 'not working', rather, all desired full-time paid employment, with teaching and research featuring most prominently.<sup>19</sup> The high number of women who gained teaching diplomas, but cannot be linked with later occupations may simply reflect inadequate alumni records. Alternatively many of these women qualified during the 1920s, before the Board of Education began reducing, as a result of spending cuts, the number of grants to women who pledged to become teachers. Thus their supply was plentiful, although the economic climate was poor and led to a reduction in the number of teaching posts. Thus some of these women may have been unemployed, not out of choice, but as a result of heavy competition.<sup>20</sup>

Fifteen women who gained doctorates, ten who gained masters degrees, two with the bachelor of medicine degree and one each with a post-graduate diploma in psychology and journalism also had no record of later employment, fellowships or awards. The subjects of many of these degrees, mathematics, botany, chemistry, psychology, embryology, engineering and physics, to name a few, appear relevant to later employment or research, and it certainly seems improbable that the women who gained them did not proceed to paid employment of some kind out of choice, although again some may have been affected by the slump. It is not possible to estimate the number of women who were thus affected, but it seems unlikely that the forty eight per cent of science graduates who had no recorded occupations were all victims of economic depression, when at most ten to twenty per cent of the general population faced unemployment. The only evidence we have for later employment however, is that presented in table 10.5, and this must provide the basis for analysis. It should certainly be borne in mind that the figures presented are likely to be minima.

**Table 10.5 OCCUPATIONS ENTERED BY FEMALE SCIENCE GRADUATES OF U.C.L. FROM 1918**

High School teachers	25
Lecturing/academic	15
Heads of high schools/college principals	10
Teachers, sector unspecified	9
Medicine/medical research	8
Ministry/senior civil service work/government research.	7
Senior high school teachers/deputy heads	7
Academic research	7
Librarians/museum workers	4
Industrial research/consultancy	3
Missionaries	1
Unoccupied	<u>1</u>
	97

**Source:** Index cards, student records, SR44 - 306 and college calendars 1920-39, U.C.L. Records Office; Directory of British Scientists (1966); Who's Who in British Science (1953); Directory of Women Teachers (1927); Hutchinson's Woman's Who's Who (1934); Shaw's Women's Who's Who (1934).

A number of points arise from table 10.5. On a positive note, the range of occupations embarked upon by female graduates was significant. Only one graduate was registered as 'unoccupied' in 1934, yet in 1939 she gained an MSc in chemistry.<sup>21</sup> It seems probable that she was taking time out from her studies, perhaps raising a family or caring for elderly parents, and that by 1939 she was keen to re-embark on her education. She is the only woman out of 253 who was actually registered 'unoccupied'. Others may have been, but we have no way of knowing, as the student records were not designed to trace such details. The largest group of women became teachers, the majority, science mistresses in high schools. This is not surprising when one considers that the only means open to most women of gaining a free university education was to apply for a Board of Education grant and later to become a teacher.<sup>22</sup> However, seven held high status posts as senior teachers and deputy heads, whilst a further ten became heads and principals. Rather than considering this an expression of traditional employment patterns, it can be regarded as a breakthrough that a significant proportion of U.C.L.'s female science graduates, thirty three per cent of those who became schoolteachers, used their qualifications to rise to the top in education.

School teaching was not the only area of education in which women were active. Fifteen became lecturers and demonstrators in university departments and college hospitals. Eleanor Brown, Marion Palmer and Katherine Tansley all rose to the high position of reader, signifying that these women did not always remain in junior positions, although a further seven held junior posts as research assistants, all at U.C.L. The fact that U.C.L.'s college calendars showed a significant number of former female graduates among its staff, who were listed neither in the student record files, nor in national directories, suggests that the calendars and staff lists of other universities may provide interesting insights into the later careers of some of these women. It should not be assumed that because U.C.L. employed a number of women in junior positions immediately after they graduated, their careers ended

here and that they did not progress to more senior positions at other institutions at a later date. The subjects in which the female lecturers were involved ranged from medicine to ophthalmology, biochemistry, mathematics, and domestic science. Dr Elsa Adcock, became biochemistry lecturer at the mining and technical college in Wigan,<sup>23</sup> a significant achievement, and one that must have taken considerable courage given that mining was such a male enclave and that male opposition to women entering the professions and providing competition was common.

The number of academics proportional to school teachers was lower than before the First World War, when the proportions in academia and schoolteaching were broadly comparable. Only thirty per cent of those whose careers were in education, became academics after 1918, still an impressive figure, but lower than prior to the war. This may simply be a reflection of the fact that a higher percentage of U.C.L.'s graduates were traced after the war than before, and thus that the women academics of the pre-war era were not representative. However, ninety four per cent of those who could be traced who graduated up to 1914 had a record of employment, compared to only fifty two per cent of those who left U.C.L. between 1918 and 1930. The higher percentage who were traced after the war comprised largely those who gained higher qualifications but for whom we have no employment details. Thus, there is no reason to suspect that the proportion of women academics is any more skewed for the pre-war than the post-war years. More probable is the explanation that a different type of woman was attracted to the universities after 1918. Not necessarily one that was more vocationally minded, as Tuke believed, but one who was of less affluent status, and thus was reliant on public funding. It appears that the most available source of funding, the Board of Education grants to intending teachers, did have the effect of shaping women's later vocational opportunities, pushing more into secondary teaching than might otherwise have been the case.

This conflicts with Perrone's finding that in the 1880s few women stayed in lecturing, tending to move on to, often better paid posts in secondary schools, whilst by the 1920s the proportion of women lecturers had grown, and the majority stayed in academia all their lives.<sup>24</sup> Certainly, before the war U.C.L. produced a number of prestigious graduates, not least Margaret Benson who by 1912 had become a professor of botany. None of those who graduated after 1918 rose to such heights. In addition a number, for example Gwenneth Haigh, Hilda Gurry and Ethel Jones who were covered in the post-war study, began academic careers at U.C.L. and then moved into schoolteaching. There is no indication from the U.C.L. data that women's absorption into academia progressed in a linear manner. The cause of this movement out of academia may have been because individual universities began imposing marriage bars on female staff. Dyhouse provides details of the attempt to oust the economist Margaret Miller from her lecturing post at Liverpool University when she married in 1932, and her battle against this ruling, and thus provides a clear example of the barriers faced by some women in academic life.<sup>25</sup> In contrast, Perrone states that a little earlier, during the 1920s, the number of female academics who married increased.<sup>26</sup> The link between the marriage bar and a declining proportion of U.C.L.'s female graduates who became lecturers is unclear, but it might be contended that the public awareness of cases such as Margaret Miller's was enough to deter educated women who were not already working in the academic profession from attempting to gain entry.

It is true however, that the number of academics may be underestimated in table 10.5. Eleven of the twenty five high school and nine unspecified teachers were only discovered because letters were sent from L.E.A.s seeking proof of their previous education at U.C.L. No such letters were sent from university departments, because unlike school teaching, it was not a legal requirement for universities to provide proof that members of their staff had actually studied for their degrees. Also, as previously stated, unlike the pre-First World War



period, the Englishwoman's Yearbook which provided a list of female science lecturers in Britain was no longer in publication during the interwar years, although the fact that U.C.L.'s staff lists have been consulted for this study biases the figures back in favour of women who entered academia. In addition, the eleven letters sent from L.E.As stated only that the women concerned were members of staff in their employment without specifying the post held by each individual. For the purposes of this study, all these women were assumed to be standard grade teachers. However, it is conceivable that a number may have held higher posts such as senior teachers or even heads, thus the numbers in these categories may be underestimated. The ambiguity of the L.E.A. letters ensures that there is no evidence for this.

In spite of the apparent rise in schoolteaching as an occupation, other areas of work proved popular. Seven women worked in high civil service positions for example. Gwendolen Evans worked as a higher executive officer in the Statistics and Intelligence Division of the Ministry of Supply, and gained an OBE in 1961. As a woman, she was eligible for a salary of between £600 and £735 per annum in 1952. Had she been male and carrying out the same role, her scale would have been between £715 and £865.<sup>27</sup> Thus even when women did rise to the top, they were rarely treated as equals with men. Dr Margaret Field became senior research officer with the Ghana Academy of Science and was appointed government anthropologist to Ghana and also published six articles between 1937 and 1960,<sup>28</sup> whilst another female graduate, number 164 in appendix C became a Director with the East Europe Department of the British Council, later gaining an OBE in 1962.<sup>29</sup> Number 9 gained her Ped in 1932 and then became science mistress at a Sidcup high school, appearing to have set herself up for a career in teaching. However, she later embarked upon a career as inspector with the Home Office Children's Department.<sup>30</sup> This suggests that an assumption that the vast number of women who gained a teaching diploma actually went into or stayed in

teaching can be inappropriate. The same applied to Kathleen Bardsley who in 1919 began a career as a secondary school teacher, but by 1927 was an inspector of schools with the Board of Education.<sup>31</sup> Graduate number 9 was one of the women who filled out a form specifying her 'desired employment' as secondary school teaching,<sup>32</sup> yet she proceeded to gain employment with the Home Office. At the point of graduating women may well have felt that teaching was a suitable and 'safe' form of employment which they could enter relatively easily. Until they gained experience and confidence, many would not have considered alternative employment a possibility. A little earlier, in 1914, Edith Morley, in her survey of women working in seven professions made a similar point, although her implication was that women claimed to wish to follow a career in teaching as a means of gaining entry to higher education even when they had different aspirations:

'If she is intelligent, well trained and eager to study, her natural impulse is to go to college, and to get there, it is still the line of least resistance to say that she wishes to become a teacher'.<sup>33</sup>

Public opinion then still felt that teaching was a 'respectable' occupation for educated women. If women knowingly sought to appease this opinion whilst having quite different aspirations, or went into teaching initially as a 'safe option' and later changed careers it seems that immediate post graduate qualifications and employment details give only a limited impression of women's career progressions. Unfortunately, most of U.C.L.'s data provides us only with this information.

One example of a pioneering female graduate of U.C.L. is number 55 in appendix C. In 1937 she gained a PhD in engineering and immediately secured employment with the Farnborough Institute. Later, she became an engineer with the Ministry of Supply, was then promoted to become principal scientific officer with the ministry, and finally became principal scientific officer with the Ministry of Imperial Aviation. She won the gold

Wakefield Medal of the Royal Aeronautical Society and was awarded an OBE in 1969.<sup>34</sup> This graduate was one of the women who filled out a form at U.C.L. expressing her 'desired employment' on graduation. She wished to carry out practical training in an engineering works,<sup>35</sup> which was exactly what she did in the short run. She then proceeded to gain much higher profile employment. This woman is an example that some could achieve employment in areas, like aeronautical engineering, which still presented many barriers although they had to struggle to do so. In fact, although there were only three female engineering graduates from U.C.L. between 1918 and 1930, all are recorded as having followed their subject beyond a first degree. Number 63 gained her BSc in 1924 and proceeded to obtain an MSc in engineering in 1929, although no information regarding her later employment is given.<sup>36</sup> Number 163 also continued her training, taking a post graduate engineering course at Imperial College between 1922 and 1923. No details of her success in this course or later employment exist.<sup>37</sup> It seems that those women who chose to study engineering, in spite of the difficulties of securing employment, were determined to succeed. The necessity for such devotion perhaps explains why so few women chose engineering as a first degree.

Medicine and medical research were also popular career choices. We already know that twelve women gained a bachelor of medicine degree post graduation and that five of these gained specialist, vocationally-orientated diplomas and degrees and four, medical doctorates. In addition thirteen gained membership of the Royal College of Surgeons (MRCS), and licentiateship of the Royal College of Physicians (LRCP), as appendix C shows. In total, eighteen held some form of medical qualification or membership, or a combination of both. Of these, eight had a record of later employment, but ten did not, even though all had graduated with vocational degrees, and one would expect that most sought paid employment. Those who are recorded with occupations all worked in fields related to medicine. Margaret Field became government anthropologist for Ghana, a highly prestigious position, Alice

Gilby, a temperance lecturer, Elfrida Hill became director of the radiotherapy department of U.C.H. demonstrating an ability to rise to a very senior hospital position. Joan Lush, also worked in a hospital as an assistant anaesthetist, Ethel Howard as a matron in a mental hospital and Hilda Weber became a physician with the Institute of Medical Psychology. Albertine Winner became Deputy Chief Medical Officer with the Ministry of Health in 1957 and in 1967 was awarded the DBE.<sup>38</sup> She is a fine example that women who were highly qualified, usually more so than their male peers, in her case holding a PhD and an MD, could overcome enormous barriers and secure rewarding and challenging positions.

Finally, a few women worked in areas other than teaching, research, government work and medicine. Four women were involved in librarianship and museum work. Graduate number 130 used her science qualification to gain the post of junior assistant at the Science Museum Library in South Kensington when she graduated in 1926. This is an example of the college having information only of a student's immediate employment details and no record of her long-term career. She may well have risen to a higher position after some years' work experience, but this is not documented, and thus her achievements may be underestimated. The three other women who gained posts in libraries secured senior positions, either as librarians or assistant librarians. These women then, were not in supportive roles, but in positions of authority.

Three women participated in industrial research and consultancy and one in medical research. There is obviously some overlap here with women who carried out scientific research in university departments: Elfrida Hill, for example who was director of the radiotherapy department at U.C.H., and those such as graduate number 55 who carried out practical engineering with various government ministries. Thus this category looks thinner than it was. However, those who were working in private industry appear to have held high

positions. Number 123 gained an MSc in chemistry and then became a consultant analyst with Lever Brothers.<sup>39</sup> Enid Bradford was a research biochemist at the Hanover Foundation Clinic in California, published numerous articles on food technology and later became a consulting chemist, and an assistant works chemist.<sup>40</sup> This suggests that employment opportunities were favourable overseas, and that Britain lost some of its female talent. Dr Margaret Field, previously mentioned, is another example of a women who gained high profile employment abroad. James Hammerton shows that by the advent of the First World War, a number of associations specialising in emigration opportunities for women existed, and continued to grow thereafter. Although most women who emigrated in the early twentieth century were lower middle class, destined for domestic service in the colonies, opportunities for highly educated women as teachers, hostel superintendents and administrators increased.<sup>41</sup> As missionaries, opportunities for educated women were even better. Forbes shows that between 1910 and 1930 women with qualifications were encouraged to work in India. This was largely because upper-caste Indian women were prohibited through modesty from seeking male medical assistance, and although some Indian women were succeeding against the odds in qualifying as doctors, there was still an excess level of demand for female doctors. Forbes argues that British women were attracted by the opportunities for professional employment rather than by a desire to carry out religious work: 'Medical missionaries who practised in India may have wanted to serve God and save souls, but for many other women this was the land of secular career opportunities'.<sup>42</sup> Over this period, forty of the female missionaries in Delhi had degrees, twenty four were doctors, and 113 had attended secondary schools. Medical women in particular were attracted due to the possibility of surgical and hospital work in India which was frequently not available in England.<sup>43</sup>

This is not to suggest that women did not succeed in professional employment at home. Kathleen Gough gained her BSc in physics and later became chief physicist with the Dubilier Condenser Company in London, a Fellow of the Institute of Physics and an associate member of the Institute of Electrical Engineers.<sup>44</sup> She is another example that women could succeed in engineering, although her first degree was not in this subject. The obstacles faced by Gough in her attempt to rise to such a senior position in private industry, which was more male dominated than teaching or the civil service would have been great. Finally, Margaret Roscoe gained her PhD in 1934 and went on to become a researcher with the Medical Research Council.<sup>45</sup>

The overwhelming impression of women who graduated from U.C.L. during the 1920s, is that they succeeded in entering a variety of high level occupations. They appear to have found more openings in research and public sector work than in private industry, in particular management posts in the private sector which were still heavily male guarded. Only a handful were in supportive roles, and none of those with a record took part in voluntary activities, although this does not mean that women did not carry out such work, as the student files are unlikely to have recorded such information. U.C.L's female graduates worked for government departments, private industry, university departments and high schools. The majority of these women also obtained post graduate qualifications which is impressive, and indicates a high level of commitment. The number of later occupations registered is almost certainly an underestimation of employment achievement, yet even the information which does exist is significant. Table 10.6 below, provides evidence of awards and fellowships which were obtained by U.C.L's graduates, offering an example of additional high achievement. Again, the number of awards is greater than the number of graduates who obtained them because some women gained more than one.

The bodies most frequently joined by U.C.L.'s graduates were the Royal College of Surgeons and the Royal College of Physicians. This is not surprising, given that twelve women graduated in medicine. The fact that thirteen women held membership and licentiatehip of the two bodies, and a further four fellowships, suggests that they were working in the field of medicine, yet only four of them have any employment record, Joan Lush and Albertine Winner, already mentioned, and Elizabeth Jenkins and Mary Thomas who both became medical practitioners.<sup>46</sup> It is probable that many more of the women who become members of the medical bodies carried out later occupations than is indicated by table 10.5, especially when it is considered that five of them had additional vocational qualifications in public health, child health, and paediatric medicine. Graduate number 79 was a member of the Royal College of Obstetricians and Gynaecologists, and yet she has no employment details.<sup>47</sup> She must have been employed in her field, and yet one is left wondering what she actually did.

In spite of these frustrations, table 10.6 acts as a form of evidence that employment was significant, particularly amongst medical graduates, by indicating that membership of the professional bodies was high. Other bodies which attracted graduates were the Association of Assistant Mistresses and the Association of Women Science Teachers, which is not surprising given that such a significant number became high school teachers. Two others were members of the Association of University Women Teachers and the London Teacher's Association. It is interesting that thirteen memberships were of women's organisations such as the female teaching societies already mentioned and the Women's Medical Federation. This suggests that women did not only associate with their professions, but with female colleagues. Professional societies which were designed specifically for women offered an important level of support, and probably solidarity, which a number of the recognised scientific societies did not. The significant participation of women in medicine is indicated

**Table 10.6 AWARDS' FELLOWSHIPS AND MEMBERSHIPS OBTAINED BY FEMALE SCIENCE GRADUATES OF U.C.L. FROM 1918**

Royal College of Surgeons/Royal College of Physicians	17
Association of Assistant Mistresses	6
Officer of the British Empire (OBE)	5
Fellow of U.C.L.*	4
Association of Women Science Teachers	3
British Medical Association	3
Royal Institute of Chemistry	3
Institute of Biology	2
Royal Medical Society	2
Agricultural Improvement Council or American Institute of Chemists (AIC)	1
Association of University Women Teachers	1
British Psychological Association	1
Commander of the British Empire (CBE)	1
Dame of the British Empire (DBE)	1
Faculty of Radiotherapists	1
Institute of Electrical Engineers	1
Institute of Physics	1
London Teacher's Association	1
National British Women's Total Abstinence Union	1
Psychological Society	1
Royal Anthropological Institute	1
Royal College of Obstetricians and Gynaecologists	1
Royal Medico-Psychological Association	1
Royal Society of Medicine	1
Society of Analytical Chemistry	1
Society of Experimental Biology	1
Society of London Medical Graduates	1
Temperance Collegiate Association	1
Women's Medical Federation	1
Zoological Society	1
	<u>66</u>

\* Fellowships were awarded to former students of U.C.L. who attained: 'distinction in art, science, literature or public life'.<sup>48</sup>

**Source:** Index cards, student records, SR44-306 and college calendars 1920-39, U.C.L. Records Office; Directory of Women Teachers (1927); Hutchinson's Woman's Who's Who (1934); Shaw's Women's Who's Who (1934); Directory of British Scientists (1964 and 1966); Institute of Physics, List of Members (1962); Who's Who in British Science (1953).

not only by their large participation as members of the Royal College of Surgeons and Royal College of Physicians, but also in the British Medical Association, Women's Medical Federation, Society of London Medical Graduates and the Royal Society of Medicine, not



to mention the societies for specialist branches of medicine such as radiotherapy and gynaecology. What is apparent is that many of the women who gained fellowships also achieved high profile employment and awards. Thus most of the women covered by table 10.6 have also appeared in the discussions regarding further qualifications and employment. This merely emphasises the extent of their success. Thirty six women became fellows or members of professional bodies, seven of whom were awarded OBEs, a CBE and a DBE. This is a credit to the pioneering qualities of these women, and signifies that they were certainly career minded and had much, particularly in the way of qualifications, to offer the economy.

One of the graduates, number 8 in appendix C, who gained a fellowship however, had no information regarding further qualifications or employment. She was recorded as a member of the 'AIC',<sup>49</sup> which is somewhat ambiguous, being the acronym either for the American Institute of Chemists or the Agricultural Improvement Council for England and Wales. However, the suggestion is that she was working at quite a high level in the field of chemistry or agriculture, although there is no information on the files. This adds weight to the contention that the student records contain only partial information on the successes of female graduates.

In conclusion, the evidence which has been presented shows that women who graduated in science were determined, successful and even pioneering. From the sheets which recorded their 'desired employment', it can be established that all women expressed a wish to work and that most were very ambitious. Therefore there is no evidence of a lack of demand amongst female graduates to secure employment. Although the data is rather patchy, it does indicate that women succeeded in gaining all types of employment, awards and qualifications. The figures presented in tables 10.1, 10.5 and 10.6 would be impressive even if based on

a complete, systematic set of records. That they are based on incomplete data makes them even more remarkable, and emphasises that there may be more successful graduates about whom we know nothing.

It has commonly been contended that women's desire to gain professional employment, in areas other than teaching was low, largely as a result of social and familial pressures to undertake domestic lifestyles, and a lack of professional female role models.<sup>50</sup> The activities of U.C.L.'s female graduates prove that this was far from universal, although it appears that more women were attracted to secondary school teaching than before the war, and that the significant contributions made by women as higher education lecturers before 1918 were not matched in the interwar period. Although these educated women were successful in a wide range of areas, it does not appear that their sphere of influence had dramatically broadened.

Literature which considers the career patterns of female university graduates in Britain during and after the 1920s is scant and is normally based on generalised employment statistics rather than on institutional case studies. However, Tylecote's study of Manchester's female graduates in the interwar period provides a useful comparison. Many of these women went into teaching, primarily because they had pledged to do so in order to gain funding, although a large number became headmistresses and a few others held academic posts. This shows a similar pattern to U.C.L.'s female science graduates. Ninety per cent of female medical graduates who could be traced secured employment, two thirds of these on a full-time basis. About one half became general practitioners, often with their husbands, whilst the remainder were split fairly evenly between public health service and hospital work. The latter was still hard for women to enter because Manchester Royal Infirmary refused women residents posts, like many other hospitals in the 1920s.<sup>51</sup> Nevertheless, Tylecote's study is useful because

it shows, as Alexander's study of pre-war medical graduates did,<sup>52</sup> that women who studied medicine were committed to employment. This strengthens the argument that at U.C.L. medically trained women with membership of professional bodies but no record of later employment are an example of the problems of incomplete alumni records rather than of a group of women who had little interest in following careers.

In spite of this, we know that in many trades, industries and professions, women were still under-represented in the 1920s. The conclusion must therefore be, that businesses and public services were reluctant to employ educated women, especially if married, even though these women formed a willing potential workforce, who were well qualified. They therefore missed an opportunity to gain high quality workers. Certainly female graduates of U.C.L. had much to offer the British economy during and after the 1920s, although they appear increasingly to have been filtered into secondary teaching and perhaps lost some of the opportunities which had been capitalised by the former generation of university women. The view that British industry failed to utilise skilled human resources and that this may have contributed to a lack of innovation in industry therefore appears to be substantiated, at least in terms of its absorption of university educated women.

### **POLYTECHNIC MEMBERS**

Unlike women who had been educated at U.C.L. there was no information within the University of Westminster archives regarding the activities of students after they left the polytechnic at Regent Street. It appears that no alumni records were collected at the time, partly because the social function of the college had precedence over the educational, and also because, unlike U.C.L., most students at Regent Street, unless they were full-time, day students, carried out paid employment and studied in the evenings. Thus, the relationship

between qualifications gained, and subsequent employment was less clear at the polytechnic than at U.C.L. The only means of gaining an impression of the connection between subjects chosen and their vocational application was to study the occupations of students who were attending evening classes at Regent Street, in order to establish whether they opted for training which enhanced their current work prospects, or whether they gained new qualifications to alter their career paths. A study of the employment carried out by those who attended evening classes also allows further comment regarding the social composition of students.

As for the period up to 1914, the candidate books, which gave details such as name, age and employment were used to gain an impression of the occupations of polytechnic members. These volumes, recorded the details of both social and educational polytechnic members without specifying which were which. Thus, in the following sample, the details of polytechnic members and their employment, probably do not relate entirely to students. Unlike the pre-war period however, there were a large number of handwritten course registers for the period 1918-1930, which recorded only those who attended educational classes. The registers were organised in three ways. The first type gave brief details of the student's name, the course studied and the course fees. Type two was more detailed, offering the same information as the first, but also a record of the students' employment, and type three related only to full-time day students, who are not included in the scope of this study. For the purposes of this exercise, type two registers were the most useful, offering a direct comparison between subjects studied, and the fields of employment in which students were already working. The registers of this type which have survived and were deemed relevant to this study were higher commerce (which included journalism), chemistry, tailor's cutting and photography. Other volumes, for example languages, also appeared in the second type of format, but were considered less relevant to the concerns of this thesis which are

scientific, technical and vocational education. Although there was not a type two register for every course offered at the polytechnic, those which did exist, covered a surprisingly broad range of subjects: commerce, pure science, practical trades and the 'new' technical science of photography. These 'example' courses add clarity to the more general information gained from the candidate books, and offer a clearer picture of the extent to which students obtained qualifications to complement or change their employment. Two methods of research have thus been used. The first, a sample of polytechnic members, based on data gleaned from the candidate books, and the second a sample of evening students based on details found in the course registers for the four subjects named above.

The following study considers polytechnic members, and is based on a one per cent sample taken from the candidate books for all years between 1918 and 1930. Given that total membership figures for this period were 32,257, double that of the pre-war period, a sample of one per cent is sufficient, accounting for 322 students and thus not within the realm of small sample statistics. 161 of each sex were recorded, thus a higher proportion of women was sampled than men, because female membership figures were lower than male. This is not problematic, because the study is interested primarily in the employment motives of women, rather than in a comparison of male and female occupations, although comments will be made on the latter. To obtain the sample of 161 males and 161 females, twelve observations were taken from each of eight years, and thirteen from each of the remaining five. The five years in which membership figures were largest were chosen for this purpose. To determine the sampling method, the total membership figures for each year were divided by twelve or thirteen respectively. Where the result was, for example forty five, every forty fifth member and their details were recorded. The results of this exercise are shown in table 10.7, and have been placed in categories for ease of analysis.

**Table 10.7 OCCUPATIONS OF POLYTECHNIC MEMBERS, 1918-1930**

<b>Occupation</b>	<b>No. of women</b>	<b>% by sex</b>	<b>No. of men</b>	<b>% by sex</b>
<b>Non occupied</b>	<b>7</b>	<b>4.3</b>	<b>9</b>	<b>5.6</b>
<b>Student</b>	<b>6</b>	<b>3.7</b>	<b>13</b>	<b>8.1</b>
<b>White collar clerical</b>	<b>107</b>	<b>66.5</b>	<b>71</b>	<b>44.1</b>
Clerk	42	26.1	63	39.2
Civil Servant	2	1.2	6	3.7
Shorthand typist	30	18.6	0	-
Secretary	17	10.7	0	-
Stenographer	12	7.5	0	-
Bookkeeper	2	1.2	0	-
Other	2	1.2	2	1.2
<b>Professional</b>	<b>10</b>	<b>6.2</b>	<b>9</b>	<b>5.6</b>
Teacher/governess	6	3.8	0	-
Correspondent	2	1.2	0	-
Architect/assistant	0	-	2	1.2
Laboratory assistant	0	-	2	1.2
Dental assistant	1	0.6	1	0.6
Draughtsman	0	-	2	1.2
Other	1	0.6	2	1.2
<b>Retail</b>	<b>17</b>	<b>10.6</b>	<b>14</b>	<b>8.7</b>
Salesman/woman	9	5.6	7	4.3
Drapery assistant	7	4.3	4	2.4
Cashier	1	0.6	0	-
Merchant/traveller	0	-	3	1.9
<b>Manufacturing</b>	<b>10</b>	<b>6.2</b>	<b>30</b>	<b>18.6</b>
Dressmaker/tailor	7	4.4	1	0.6
Mechanic/engineer	0	-	14	8.8
Engraver	0	-	3	1.9
Milliner	1	0.6	0	-
Other*	2	1.2	12	7.3
<b>Domestic Service</b>	<b>3</b>	<b>1.9</b>	<b>4</b>	<b>2.5</b>
Apprentice	0	-	3	1.9
Military	0	-	2	1.2
Miscellaneous	<u>1</u>	<u>0.6</u>	<u>6</u>	<u>3.7</u>
<b>Total</b>	<b>161</b>	<b>100.0</b>	<b>161</b>	<b>100.0</b>

\* Fourteen different occupations are covered by this category, each of which employed only one person. Examples are furrier, vanbuilder, cabinet maker, buttonholer and tracer.

**Source:** Candidate books, p106a and p107a, University of Westminster archives.

The most striking observation from table 10.7 is that white collar clerical work was the single largest category of employment for both men and women, and that female participation in this area of work was especially large, at 66.5 per cent of their total, a significant majority. This supports the view that clerical work was a rapidly expanding area of employment for women from the late nineteenth century to the interwar years, indeed this period has sometimes been described as a 'white blouse revolution'<sup>53</sup>. Until the late nineteenth century, shorthand had been almost entirely a 'male' occupation,<sup>54</sup> although increasingly, with the development of typewriters, and the 'twin art' of shorthand and typing, women began to take over jobs previously dominated by men. This trend is confirmed by the data from the polytechnic which shows that thirty women were employed as shorthand typists. Not one male was working in this area however. For both men and women, clerking was the most significant type of white collar employment, implying that although shorthand and typing were increasingly regarded as 'female work', the majority of women polytechnic members were not occupied in this area, but competed more directly with men as clerks. On balance, women worked in a much broader range of clerical occupations than men, as table 10.7 shows. Although their work was often awarded low pay and status, opportunities in clerical work were undoubtedly larger than in other fields of employment, which acted as an incentive to many women. Manufacturing, for example, was an area in which women's participation was much lower than men's. Ten women worked in this field compared to thirty men. The vast majority of these women worked in the clothing trades with the exception of one who was a tracer. In contrast, men worked in a range of manufacturing occupations. Significantly the area in which the largest single group worked was engineering and mechanics, trades which, even by the 1920s, women found incredibly difficult to enter.<sup>55</sup>

Prior to the First World War women had outnumbered men as manufacturing workers in the candidate books, as table 5.2 indicated. In contrast, more men had been employed in the white collar clerical sector than women. By the 1920s this picture had significantly reversed, partly due to the growth of white collar opportunities for women, but also because of a contraction of traditional female manufacturing employment such as dressmaking and millinery. Table 5.2 shows that between 1905 and 1913 these two occupations employed a large number and proportion of women. By the 1920s, this level of participation had fallen significantly from seventeen dressmakers or 11.3 per cent of the total to seven, only 4.4 per cent and from ten milliners, 6.7 per cent, to one, a tiny 0.6 per cent of the total. The decline of women's traditional areas of employment during and after the First World War has been recognised by Deborah Thom and P G Hall as something which was occurring on a wider, national scale.<sup>56</sup>

It seems that in spite of the growth of newer 'light' industries which were large employers of women especially in London and the south East,<sup>57</sup> female manufacturing workers who had been employed in the traditional clothing trades were not simply reabsorbed into the 'new' manufacturing labour force. Rather, a shift seems to have taken place between manufacturing and white collar work. The latter, although frequently underpaid, held higher esteem and status than factory or production line work, and thus attracted more women, certainly those who were polytechnic members, than the 'new industries'. Given that white collar work was a growing field of employment for the lower middle classes, although some working-class girls did move into such occupations, it might be contended that the social backgrounds of those who attended the polytechnic were different by the 1920s, than had been the case prior to the First World War, and that the polytechnic was becoming less of a working-class institution, especially as far as its female members were concerned.



In retail, there was a further reversal on the pre-war years, when more men had been employed in this sector than women. By the 1920s, 10.6 per cent of the female sample, compared to 8.7 per cent of the male were working in the retail sector. This further emphasises that women embraced new opportunities in sectors of employment which were perceived to be of higher status than factory work, and that increasingly such occupations began to be defined as 'female work'. Sales work was considered appropriate for young women of middle income families as well as for working class girls, and thus again it appears that there was a tendency for the polytechnic to attract female members from a different social background in the interwar period than in the pre-war years. This is further exemplified by a slight growth in the proportion of female professional workers from six per cent of the total before 1913 to 6.2 per cent by the 1920s, the largest group of whom were teachers, and the second largest, correspondents. In contrast, there was a slight fall in the proportion of male professional workers from 6.7 per cent in the pre-war period to 5.6 per cent by the 1920s. The change however, is slight, and not indicative of any long term trend.

The combined percentage of women who worked in white collar clerical, retail and professional areas was 83.3 per cent, an extremely large proportion, in contrast to only 8.1 per cent who worked in manufacturing and domestic service. Before 1913, these figures were forty six per cent and 27.3 per cent respectively, still showing that the largest single group of women were 'white blouse' workers, but also that there was a much more significant minority in manufacturing than was the case by the 1920s. For men, this change was much less distinct, the percentages of white collar and manufacturing workers remaining quite similar across the whole period. It can be contended then, that the polytechnic, by the 1920s, was attracting a female membership which was increasingly lower middle-class, or at least artisan, both in relation to the occupations of female members before the war, and when compared to the social backgrounds of men at the polytechnic during the 1920s.

A qualification to this view, is that prior to 1913, twenty four per cent of women were registered as 'non occupied', whereas by the 1920s only 4.3 per cent stated that they were not employed. This shows, firstly, that many more women engaged in paid work by the 1920s, and thus the likelihood of their studying at the polytechnic (if they were studying, and not only social members) to gain vocational qualifications, was greater than before the war. Secondly, it is conceivable that many of those who were described as 'non occupied' before 1913 were middle-class women, who were affected by social conventions which stated they should not seek paid employment. Such women possibly used the polytechnic either for social or educational reasons, to follow interests and hobbies. By the 1920s, middle-class women could more freely enter the labour force, especially as clerical workers. Thus the growth of polytechnic members who were engaged in white collar work is only a partial indication that the polytechnic was attracting more lower middle than working-class girls. It suggests that the polytechnic had always had a significant number of lower middle-class female members, but that prior to 1913, these were less commonly in paid employment. What seems clear, is that the working-class female contingent which existed before the war had been largely eroded by the 1920s, and thus that some social shift had taken place.

The label 'working-class' disguises the fact however that before the war, women who worked in the clothing trades around Regent Street were often from relatively well-to-do backgrounds. The tailoring centre comprising Regent Street, Oxford Street and Piccadilly was highly respectable, with areas renowned for high class men's tailoring such as Saville Row, and also for expensive women's gown makers. Therefore, the decline of this sector after the war did not necessarily contribute to a decline in the number of 'working-class' women who sought training at the polytechnic.<sup>58</sup>

It was suggested in chapter five, that because so few women took examinations in practical trade subjects before the First World War, the majority of female members who worked in the manufacturing sector, used the polytechnic as a means of altering their career paths rather than strengthening them. During the 1920s, practical trade examinations were still rarely taken by women especially if they led to City and Guilds qualifications, as table 9.2 demonstrated. Tailoring was possibly the one exception. In contrast, the most popular areas of study were commerce, languages, photography and pure sciences. This implies that by the 1920s, most women who attended the polytechnic education department wished to remain within the commercial, clerical and professional sectors in which they already worked, although some undoubtedly aimed to acquire new skills which would enable them to move into new fields within their occupational sectors. The extremely large proportion of women who studied journalism for example, were white collar workers, but there is no indication that large numbers of women were already employed as journalists when they entered the polytechnic. Of the 'professional' women shown in table 10.7, only two were registered as 'correspondents'. Certainly the qualifications these women gained may have given them greater opportunities to procure higher profile jobs within their current occupational fields, but what appears to have been occurring on a much lower scale than prior to 1914, was the ability of young working-class women to gain qualifications, for example in commerce, science and languages, which might ultimately alter their social position and even their class status. Given that it had become cheaper to study at the polytechnic, in real terms, during the 1920s than before the war, as discussed in chapter nine, it seems that working-class women became less willing to study in the interwar period than in earlier years, and not that they were restricted from doing so.

One explanation for this is that as women's traditional manufacturing trades such as dressmaking, millinery and embroidery, which were relatively skilled, declined, and as new

areas of employment such as assembly line work, which tended to be awarded low status, little training and few opportunities for promotion,<sup>59</sup> grew, female manufacturing workers came to see that there was little point in gaining training and qualifications, when their opportunities for occupational mobility were so slight. Perhaps more realistically, most of the newer industries such as electrical engineering and vehicle manufacture were situated on the outskirts of London in areas such as the Lea Valley, West Middlesex and Park Royal, and thus the women employed there were unlikely to travel to Regent Street to train, but rather attended evening schools close to their work location.<sup>60</sup> The polytechnic at Regent Street had become, by the 1920s, an institution predominantly for the lower middle classes, especially with regard to its female membership.

The following section considers in closer detail, the occupations of known students listed in the course registers. Thus unlike the information retrieved from the candidate books, this data can be used to establish the motivation of students as opposed to members. The study is based on information gained from the second type of course register outlined earlier, which existed for journalism, photography, chemistry and tailor's cutting. Journalism was one of a number of courses within the volumes for 'higher commerce'. Although there was a full run of these volumes from 1918-1930, journalism only appeared in the four years 1920 to 1923, therefore these were the only dates consulted. Volumes for photography survived for the years 1919, 1924, and 1926 to 1929. Chemistry registers were available for 1920, 1921, 1924 and 1927, whilst tailor's cutting was the most comprehensive, and covered the years 1922 and then 1924 to 1929.

Research carried out for chapter nine, showed that the total number of men registered on these four courses, for these particular years was 3,707 and that the number of women was 1,059. It was originally intended to work with a sample of 145 of each sex, which

represented four per cent of men and fourteen per cent of women, a significant sample in each case. The weighting of the female sample, was not considered problematic, because although some comparison between the sexes is necessary, it is not the primary aim of this study. However the number of observations was smaller for some courses than others, because fewer people registered in some subject areas. This was not a problem for photography, chemistry and tailor's cutting where the sampling method produced a number of men and women which was always over twenty. For journalism however, because only sixty seven men and forty nine women enrolled over the full four years, a mere three men and seven women were observed. For this reason a heavier sample was taken from this course, forty per cent of men, and forty seven per cent of women, or twenty seven male and twenty three female observations. This avoided falling into the realm of small sample statistics, and provided details over all four courses of 165 men and 165 women. The results are shown in the following tables, and have been placed in categories for ease of analysis.

The men and women who studied journalism at the polytechnic had remarkably similar rates of participation in each occupational category. In both cases, a relatively small percentage were already working in the field of journalism, thirteen per cent of women and just over eleven per cent of men. In contrast, the largest area of employment for both men and women was clerical work, accounting for over sixty per cent of the male and female samples. This suggests that the majority of men and women who studied journalism at the polytechnic did so to alter their career paths, unless they had only amateur interests, which seems unlikely given the vocational bias of this course. However, although a large number of men and women did not work specifically as journalists, some may have had links with the trade. The teacher for example, if she taught English, had a potential interest in the more vocational applications of her subject, the man who worked in advertising had closed relations with the

media, and the manager may have worked in an area related to the press, publicity or publishing and thus found a grasp of journalism advantageous.

**Table 10.8 OCCUPATIONS OF STUDENTS OF JOURNALISM, 1920-1923**

Occupation	No. of women	% by sex	No. of men	% by sex
<b>Working in Journalism</b>	<b>3</b>	<b>13.0</b>	<b>3</b>	<b>11.1</b>
Journalist	2	8.7	2	7.4
Copy Writer	1	4.3	1	3.7
<b>Clerical</b>	<b>16</b>	<b>69.4</b>	<b>17</b>	<b>62.9</b>
Shorthand typist	5	21.7	1	3.7
Secretary	3	13.0	0	-
Civil servant	3	13.0	2	7.4
Clerk	2	8.7	14	51.8
Stenographer	2	8.7	0	-
Telephonist	1	4.3	0	-
<b>Professional</b>	<b>2</b>	<b>8.6</b>	<b>3</b>	<b>11.1</b>
Teacher	1	4.3	0	-
Reader	1	4.3	0	-
Manager	0	-	1	3.7
Bookbinder	0	-	1	3.7
Accountant	0	-	1	3.7
<b>Service</b>	<b>0</b>	<b>-</b>	<b>2</b>	<b>7.4</b>
Cashier	0	-	1	3.7
Advertising	0	-	1	3.7
<b>Student</b>	<b>2</b>	<b>8.7</b>	<b>1</b>	<b>3.7</b>
<b>Unemployed</b>	<b>0</b>	<b>-</b>	<b>1</b>	<b>3.7</b>
<b>Total</b>	<b>23</b>	<b>100.0</b>	<b>27</b>	<b>100.0</b>

**Source:** Course registers for higher commerce, 1920-1923, University of Westminster archives.

It is difficult to establish the role of the woman defined as a 'reader'. It is unlikely that she held an academic post in a university given that she was studying at a polytechnic, and that so few women held high status academic positions at this time. It is more probable that she was a proof reader of some description. If this were the case, then she may have benefited from a clearer understanding of the principles of journalism. All these assumptions are speculative because of the imprecise nature of the occupational descriptions of the students.

However, if we assume for the moment that these suggestions are correct, it appears that 21.7 per cent of women worked in areas closely related to journalism compared to 18.5 per cent of men, a slightly higher proportion, but significantly, accounting for only one fifth of all the women who studied journalism at the polytechnic. The majority appear to have chosen this subject as a means of qualifying themselves to move from white collar clerical work into a form of professional employment. Before the First World War, a number of female manufacturing workers attempted to alter their career paths whilst at the polytechnic. The case of journalism in the 1920s shows that women were just as keen to 'progress', but that in this instance the move was from white collar clerical to professional. At one level then, the polytechnic still acted as an agent of change.

The case of photography was rather different, as table 10.9 shows. For both men and women, the largest single category of employment was photography, which suggests that most students who studied this course wished to enhance their current employment prospects. Of those already working in the photographic trade, a larger proportion of men classed themselves as 'photographers' than women, which suggests that they found it easier to rise to the top of the profession. One of the male 'photographers' however, was aged fifteen, which appears rather young to have been at a senior position within the trade. The problem with this, and any other data, which relies on students' own description of their achievements, is that it is always prone to exaggeration or inaccuracy. Whilst men appeared to 'boost' their status a little, women in contrast undervalued their status or described it in rather vague terms. For example, the proportion of men who described their work with the non-specific label of 'photography' was just under three per cent, whilst women who claimed the same, accounted for just under eight per cent, a larger group. One is left wondering what work these women performed, whether they were assistants, or whether they chose to be modest about their achievements. We know, however, that 12.5 per cent of females

**Table 10.9 OCCUPATIONS OF STUDENTS OF PHOTOGRAPHY, 1919-1929**

Occupation	No. of women	% by sex	No. of men	% by sex
<b>Working in photography</b>	<b>41</b>	<b>46.6</b>	<b>19</b>	<b>54.3</b>
Photographer	12	13.7	8	22.8
Assistant photographer	11	12.5	3	8.6
'Photography'	7	7.9	1	2.9
Photographic printer	4	4.5	1	2.9
Retoucher	4	4.5	0	-
Other	3	3.5	6	17.1
<b>Clerical</b>	<b>20</b>	<b>22.7</b>	<b>6</b>	<b>17.1</b>
Clerk	7	7.9	4	11.4
Secretary	4	4.5	0	-
Receptionist	3	3.5	0	-
Typist	2	2.3	0	-
Other	4	4.5	2	5.7
<b>Professional</b>	<b>13</b>	<b>14.8</b>	<b>1</b>	<b>2.9</b>
Artist	5	5.7	0	-
Teacher	4	4.5	0	-
Journalist	2	2.3	0	-
Chemist	2	2.3	0	-
Draughtsman	0	-	1	2.9
<b>Manufacturing</b>	<b>1</b>	<b>1.1</b>	<b>3</b>	<b>8.6</b>
<b>Service</b>	<b>0</b>	<b>-</b>	<b>3</b>	<b>8.6</b>
Insurance	0	-	2	5.7
Advertising	0	-	1	2.9
<b>Apprentice</b>	<b>0</b>	<b>-</b>	<b>1</b>	<b>2.8</b>
<b>Student</b>	<b>2</b>	<b>2.3</b>	<b>1</b>	<b>2.8</b>
<b>Unoccupied</b>	<b><u>11</u></b>	<b><u>12.5</u></b>	<b><u>1</u></b>	<b><u>2.8</u></b>
<b>Total</b>	<b>88</b>	<b>100.0</b>	<b>35</b>	<b>100.0</b>

**Source:** Course registers for photography, 1919, 1924 and 1926-1929, University of Westminster archives.

compared to 8.6 per cent of males were assistant photographers, which is a reversal on the proportions of men and women who were recorded as photographers. The claims of the polytechnic prospectus, that photography was a growing area of employment for women, in which they would soon outnumber men,<sup>61</sup> were probably true, but did not comment on the fact that, although, numerically, women could succeed in this trade, in qualitative terms, they still found it harder than men to gain high level positions. It could be argued however, that this was precisely the reason why women chose to study at the polytechnic. They aimed to



improve their skills and qualifications in order to gain promotion, or set up privately as photographers. It certainly appears, that amongst both women and men, there was a significant desire to study photography as a means of enhancing current employment opportunities.

This also applies to women who at first glance, appear to have been working in other areas, but in reality may have studied photography as a means of improving their chances of promotion or performance. A much larger proportion of women, nearly fifteen per cent, than men, only three per cent, were professional workers, and it is possible to see relevant connections between their occupations and the importance of photography. Five, for example, were artists, and presumably considered photography, the latest 'art form' a useful skill which would enhance their work. Two were journalists, and therefore working in a profession in which photographic illustration increasingly went hand in hand with the written word. This was emphasised in the Girl's Realm as early as 1902:

'A point which I cannot too strongly impress upon the young journalist, viz, the advantage of being able to take a photograph in any place or incident... your photographs will be an immense help in enabling the editor to come to a decision'<sup>62</sup>

The subjects taught by the four women teachers are not specified. However, it is possible that if they taught chemistry, or art, a knowledge of photography was of potential use. Similarly, it was probably in the interests of the two women chemists to have gained an understanding of photographic processing. Such conclusions can only be speculative, indeed all these women may have studied photography purely out of interest. However, a much clearer connection is apparent between the work done by women who were not already working in the photographic trade and the relevance of photography to that work, than is the case for men who had non-photographic occupations. There was only one male professional, a draughtsman, who may have found photography a useful addition to his skills. It is more

difficult to perceive a direct link between the three working in manufacturing, one an engineer, another an electrician and one who was unspecified, (although the latter may have been involved in the production of photographic equipment), and the relevance of photography to their trades.

A significant proportion of both men and women worked within the clerical sector. Of the men, two worked as bank clerks, one as a bank official and another, as a civil servant. There is certainly no obvious link here between photography and an enhancement of their employment. Two male clerks remain ambiguous, and it may have been that these worked for photographic businesses. However, on balance, these men had no connection with the photographic trade, and thus studied either purely for interest, or totally to alter their career paths. It is possible, in contrast, to claim a greater link between female clerical workers and the photographic trade. Of the seven women who were clerks only one worked in a bank, the others were undefined and thus may have been working for photographers. In addition, it is conceivable that those who were 'receptionists' were working for photographic studios. If this was the case, it appears that they had a specific motivation for studying photography. Women who worked as clerical, or support staff to photographers, possibly became interested in the trade itself, and aspired to move out of their current occupations into a professional line of employment of which they had some understanding and in which opportunities for women were good. The polytechnic at Regent Street appears to have offered them the opportunity to do this.

Thus, like journalism, photography was a course which a number of clerical workers studied, presumably as a means of moving from white collar to more professional work. This re-emphasises that by the interwar period, the polytechnic still acted as a mechanism by which young people could alter their employment prospects, but that the shift was now much less

from manufacturing to commercial or scientific, but rather from white collar clerical to professional. In contrast with the course in journalism, a very large proportion of the women who studied photography, nearly forty seven per cent, were already working within the trade. This supports the view that photography was a field of employment to which women both aspired, and succeeded in gaining work. However, the example of the course in photography raises the question of whether women's primary aim in studying was to gain employment, as 12.5 per cent of women compared to just under three per cent of men were registered unoccupied during the 1920s. It has been suggested that photography, like art is a subject which a number of women studied out of amateur interest rather than through any real desire to gain employment.<sup>63</sup> It is impossible to say whether this was the case with regard to the women at the polytechnic, or whether they were genuinely unemployed, suffering from the economic slump, and aiming to gain new skills and qualifications to enhance their prospects of gaining work. What is noticeable, is that the proportion of female polytechnic members, shown in table 10.7, who were unoccupied was only 4.3 per cent, and thus that the proportion of women who were not in paid employment and studying photography was higher than average. This suggests that photography was a course which attracted more 'amateur' participants than other courses. In spite of this however, the large proportion of women, over eighty seven per cent, were occupied whilst attending the polytechnic, and the majority of these appear to have studied photography as a means of enhancing their current employment opportunities. The course in chemistry presented a similar case.

Table 10.10 shows that a large proportion of both men and women were already working within the chemical profession whilst they attended the polytechnic, although this participation was not as significant as it was for those who studied photography. The reason for this, especially amongst women, was a large number of full-time students, of whom forty five per cent were medical and dental students, who made up a significant proportion of those

studying chemistry at the polytechnic. Whilst these were not already employed within the chemistry profession, they appear to have studied chemistry as part of a programme which would eventually qualify them as scientific or medical workers. Thus amongst chemistry students, a significant number of the women were directly committed to scientific careers, and studied chemistry as a means of enhancing their prospects. These two groups accounted for just over fifty nine per cent of the female total. Although a slightly higher proportion of men already carried out work related to chemistry, a much smaller percentage were students, only thirteen per cent. Thus forty three per cent of men had a direct commitment to chemistry. Surprisingly, of the women who were already employed in chemistry, the largest group, 14.8 per cent, defined themselves as chemists. This compares to only 11.6 per cent of men. In contrast a higher proportion of men were assistant chemists than women. Thus women appear to have been successful in gaining high level jobs, and indeed this corroborates Neal Ferguson's opinion, that middle-class women had far greater opportunities in employment than working-class women during the interwar period.<sup>64</sup> It is fair to describe most women who studied chemistry at the polytechnic as middle-class, because so many were full-time students, which, as shown in previous chapters, was an expensive option during the 1920s.

The third largest group of women were professionals, another indication that the social backgrounds of most of these were different from those of women studying other courses. The majority of these women were teachers, who, if they were teachers of science, had specific reasons for gaining further training in chemistry. Male professionals were also a significant group, the majority again working in areas which would have benefited from a training in chemistry: gas engineering, teaching, dental and municipal work for example. The relevance of chemistry to the architect and the draughtsman is less clear. The only

**Table 10.10 OCCUPATIONS OF STUDENTS OF CHEMISTRY, 1920-1927**

Occupation	No. of women	% by sex	No. of men	% by sex
<b>Working in chemistry</b>	<b>7</b>	<b>25.9</b>	<b>21</b>	<b>30.4</b>
Chemist	4	14.8	8	11.6
Assistant chemist	2	7.4	8	11.6
Chemist's apprentice	1	3.7	0	-
Laboratory assistant	0	-	5	7.2
<b>Clerical</b>	<b>3</b>	<b>11.1</b>	<b>13</b>	<b>18.8</b>
Clerk	2	7.4	13	18.8
Shorthand typist	1	3.7	0	-
<b>Professional</b>	<b>4</b>	<b>14.8</b>	<b>12</b>	<b>17.4</b>
Teacher	3	11.1	2	2.9
Gas engineer	0	-	5	7.2
Other*	1	3.7	5	7.2
<b>Manufacturing</b>	<b>0</b>	<b>-</b>	<b>3</b>	<b>4.3</b>
Polish maker/mixer	0	-	2	2.9
Silk merchant	0	-	1	1.4
<b>Managerial</b>	<b>1</b>	<b>3.7</b>	<b>2</b>	<b>2.9</b>
Apprentice	0	-	3	4.3
<b>Student</b>	<b>9</b>	<b>33.3</b>	<b>9</b>	<b>13.0</b>
<b>Unoccupied</b>	<b><u>3</u></b>	<b><u>11.1</u></b>	<b><u>6</u></b>	<b><u>8.7</u></b>
<b>Total</b>	<b>27</b>	<b>100.0</b>	<b>69</b>	<b>100.0</b>

\* Six different occupations are covered by this category, each of which employed only one person. They are: dental mechanic, municipal officer, architect, draughtsman, photographic worker and correspondent. The latter was the only one of these occupations held by a woman.

**Source:** Course registers for chemistry, 1920, 1921, 1924 and 1927, University of Westminster archives.

occupational group which was significant to both males and females and appears to have had little connection with chemistry was clerical work. As with all the aforementioned courses, there was a significant contingent of clerks and typists who wished to study subjects which might lead to new, perhaps more professional occupations, in this case chemistry. On balance however, certainly for women, this was a course which appealed primarily to middle-class professionals and committed students.

A quick calculation shows that approximately eighty three per cent of women were working in areas in some way related to chemistry, and seventy six per cent of men could claim the same. At this level, the polytechnic catered for a fairly élite group, certainly of women, and did not attract any female manufacturing workers. Just over four per cent of men worked in manufacturing, but even this was a small proportion. These findings clarify the information from the candidate books by showing that firstly, polytechnic membership was increasingly middle-class by the 1920s, secondly it was rare for manufacturing workers to obtain training in areas not connected to their occupational sectors and finally, that this was more pronounced with regard to women than men. The example of chemistry supports this finding, and suggests that by the interwar period opportunities for working-class women were low, both in education and employment, and that women of a higher social status benefited to a greater extent than these women.

This can be further demonstrated by examining the case of tailor's cutting where most of the polytechnic's female working-class population were to be found. Table 10.11 presents details of the occupations of women and men who trained to be tailors at the polytechnic.

A number of significant points arise from table 10.11. Firstly, the vast majority of both men and women who studied tailoring were already working within the clothing trades, in the case of women, one hundred per cent. Table 10.7 shows that of all manufacturing workers at the polytechnic this was a common trend. Secondly, this is the first course in which no clerical workers have appeared, thus it seems that aspirations and mobility worked very much in one direction, from manufacturing to clerical before the war, and from clerical to professional after the war. As virtually no female manufacturing workers were observed on the courses in journalism, photography and chemistry, it appears that working-class women by the 1920s

**Table 10.11 OCCUPATIONS OF STUDENTS OF TAILOR'S CUTTING, 1922-1929**

Occupation	No. of women	% by sex	No. of men	% by sex
<b>Clothing trades</b>	<b>23</b>	<b>100.0</b>	<b>36</b>	<b>94.7</b>
Tailor	14	60.9	22	57.9
Dressmaker	6	26.1	0	-
Tailor's trimmer	0	-	5	13.2
Tailor's assistant	0	-	4	10.5
Tailor's cutter	0	-	2	5.3
'Tailoring'	0	-	2	5.3
Tailoring teacher	1	4.3	0	-
Salesperson/fitter	1	4.3	1	2.5
Designer	1	4.3	0	-
<b>Student</b>	<b>0</b>	<b>-</b>	<b>2</b>	<b>5.3</b>
<b>Total</b>	<b>23</b>	<b>100.0</b>	<b>38</b>	<b>100.0</b>

**Source:** Course registers for tailor's cutting, 1922 and 1924-1929, University of Westminster archives.

either opted for training in skills closely related to their trades, or did not participate at the polytechnic to any significant degree. Mobility outside their occupational sectors was very slight. A third observation is that not one male or female tailoring student was registered as 'unoccupied'. This sets them apart from men and women on other courses, where the proportion who were not in paid employment or studying, was much larger. This strengthens the argument that the men and women who studied tailoring were working-class people who relied on remunerative employment to support themselves financially. Photography and chemistry appear to have had a higher middle-class contingent, and thus the number 'unoccupied' on these courses probably reflects that some of them came from social backgrounds where there was less need to be self-supporting.

A notable finding is that of the women who worked in the clothing trades, the vast majority, over sixty per cent, were tailoresses, and therefore worked within a branch of the trade which held higher status and better pay than dressmaking. Before the First World War,

tailoring had been heavily male dominated, but by the 1920s opportunities for women were growing, largely due to changes in female fashions, and a greater demand for tailored items such as jackets.<sup>65</sup> Indeed, at the polytechnic the proportion of women who were already employed as tailors was higher than it was for men. In addition just over twenty six per cent of women were employed as dressmakers, and presumably gained a training in tailoring to improve their employment prospects and their earning potential. In terms of skill, female dressmakers were probably equally, if not more competent than the male tailor's assistants and trimmers. However, they were rarely rewarded equally, financially or otherwise for their abilities, and thus the polytechnic offered them the opportunity to acquire additional skills which could greatly enhance their work prospects. It is not correct to allege that there was no mobility amongst working-class women as a result of their education, and it is significant that so many were tailors. However, the extent of mobility for these women was still within the boundaries of the occupational sector in which they already worked, rather than into alternative types of employment, although if this meant they could move into West End tailoring firms, increased social status was almost guaranteed.

Generally this was a trend common to all courses at the polytechnic during the 1920s. Professional courses attracted large numbers of professional workers, middle-class women and full-time students, whilst practical trade classes appealed almost entirely to a working-class community. This conclusion is perhaps not surprising, yet the shift between occupational sectors before the First World War, was more significant. The exception during the 1920s was a significant group of clerical workers who appeared on most professional courses, aiming, one assumes, to alter their career paths. This was partly due to the increase in white collar workers amongst the polytechnic's membership during the 1920s and partly because of a significant reduction in manufacturing workers at the polytechnic, explained essentially by a reduction in employment opportunities in the clothing trades, and the



situation of 'new industries' outside the centre of London. The polytechnic itself cannot be blamed for this, because most courses, with the exception of some practical trade subjects, held up no barriers to women. Also in real terms, studying at the polytechnic was cheaper after the First World War than before, as table 9.13 demonstrated, so in theory, working-class women should have been more encouraged to attend the polytechnic than before the war.

It seems that by the 1920s, the shift from manufacturing to commercial employment, which the polytechnic had played such a large part in before 1913 by providing relevant training, had already occurred, exemplified by the extremely large numbers of female clerical workers who attended the polytechnic during the 1920s. The 'new' women manufacturing workers of the interwar years were situated primarily in the outskirts of London and thus, if they wished to take evening classes probably attended a college closer to home than the polytechnic at Regent Street.<sup>66</sup> The type of students, and their requirements of the polytechnic had thus changed by the 1920s. The polytechnic founded by Quintin Hogg as an establishment for young working people, was fast becoming an institution of the lower middle classes, many of whom had professional aspirations. The working-classes, when they attended, took part in a small range of practical trade courses designed to improve their existing skills, rather than significantly to alter their career options, although the pre-war tendency to avoid the domestic classes designed specifically to train young women for domestic service and home management, prevailed.

## NOTES TO CHAPTER TEN

1. L Hall (1994), p. 192.
2. Ibid, pp. 195-6 and p. 200.
3. Ibid, pp. 194-5 and pp. 198-9.
4. Minutes of college committee, October 1925 - July 1926, point 127d, Appendix VI.
5. Student record, SR75, U.C.L. Records Office.
6. Who Was Who, a cumulative index (1981).
7. These were, The Macmillan Dictionary of Women's Biography (1989), The Europa Biographical Dictionary of British Women (1983), Biographies of British Women (1993, Mansell) and a Women's Who's Who (1975, Women in Management).
8. E Eschbach (1993), p. 189.
9. J Hubback (1957), pp. 44-53.
10. P Butcher (1989), p. 80.
11. These figures were calculated from lists of departments and staff in the college calendars for 1918-1930, U.C.L. Records Office.
12. M Rendel (1980), pp. 146-8 claims that just under ten per cent of university lecturers in Britain were female by 1930 whilst F Perrone (1993), p. 344 offers a higher figure of fourteen per cent. Perrone's calculation of the proportion of U.C.L's teaching staff that were female, like mine, was sixteen per cent. In both cases, demonstrators and assistants were included in the figures, whereas, Rendel's figures only include established and recognised academics explaining why they are lower.
13. F Perrone, op.cit, pp. 346-7.
14. See Directory of Women Teachers (1914), p. 167; (1927), p. 348 and Hutchinson's Women's Who's (1934), p. 397.
15. See E Edwards (1993), p. 277 and p. 279; J Antler (1980), pp. 409-14; A J Hammerton (1979), p. 155, p. 161 and p. 168.
16. M Tuke (1928), pp. 75-6.
17. My grateful thanks to Naushaba Singh and Alka Ahluwalia, both of Thames Valley University, who kindly offered their assistance in this task. The names of the undefined Asian students were Subramonia Iyer Krishnamurti, Kazutaro Yasukawa, Ting Liang Woo, Iqbal Kishen Taimni, Kun Hou Lih, Indu Bhushan Brahmachari, Tsutomu Kondo, Te-Pei Feng, Lih Chen, Yen Shou Chiong, Yele Appajee, Fon Yen Hsu and Ta-Jen Wu.
18. C Willis Dixon (1986), p. 1 and p. 41.

19. See student records SR119, SR121, SR124, SR125, SR126, SR127, SR131, SR143, SR166, U.C.L. Records Office.
20. R D Anderson (1992), p. 23; M Tylecote (1941), p. 117; K Anderson (1963), p. 13.
21. This information was obtained from the index cards in U.C.L.'s Records Office.
22. SPR.MIC.E.291, parliamentary papers, 1911, LIX, pp. 2-6 of section beginning p.17, British Library; M Tylecote (1941), p. 135.
23. See Department of Scientific and Industrial Research, Directory of British Scientists (1964), p. 7 and (1966, Volume 1), p. 8.
24. F Perrone (1993), pp. 350-1.
25. C Dyhouse (1995), pp. 162-7.
26. F Perrone, op.cit, p. 361.
27. See British Imperial Calendar and Civil Service List (1952), p. 721.
28. See student record, SR175, U.C.L. Records Office; also Department of Scientific and Industrial Research, Directory of British Scientists (1966, Vol. 1), p. 569.
29. This information was obtained from the index cards in U.C.L.'s Records Office.
30. Ibid.
31. Directory of Women Teachers (1927), p. 23; Who's Who in British Science (1953), p. 20.
32. Student record, SR127, U.C.L. Records Office.
33. E Morley (1914), p. 11.
34. See student record, SR166, U.C.L. Records Office.
35. Student record, SR166, U.C.L. Records Office.
36. This information was obtained from the index cards in U.C.L.'s Records Office.
37. Student record, SR69, U.C.L. Records Office.
38. Hutchinson's Women's Who's Who (1934), p. 524; Shaw's Women's Who's Who (1934), p. 402.
39. This information was obtained from the index cards in U.C.L.'s Records Office.
40. See student record, SR153, U.C.L. Records Office; also Department of Scientific and Industrial Research, Directory of British Scientists (1966, Volume 1), p. 185; Shaw's Women's Who's Who (1934), p. 85.
41. A James Hammerton, op.cit, pp. 173-7; J Bush (1994), pp. 387-91.
42. G Forbes (1994), p. 518.

43. J Cox (1990) pp. 12-14.
44. See Institute of Physics, List of Members (1962), p. 149.
45. Hutchinson's Women's Who's Who (1934), p. 418.
46. Shaw's Women's Who's Who (1934), p. 233; Hutchinson's Women's Who's Who (1934), p. 477.
47. See student record, SR131, U.C.L. Records Office.
48. College calendar (1937), p. 506.
49. This information was obtained from the index cards in U.C.L.'s Records Office.
50. E Eschbach, op.cit, p. 189.
51. M Tylecote (1941), pp. 121-2 and pp. 134-8.
52. W Alexander (1987), pp. 60-63.
53. G Anderson (1988), used the phrase 'white blouse revolution' to title his recent work.
54. G Carnaffon (1988), pp. 79-81.
55. M Sanderson (1972), p. 336.
56. D Thom (1988), p. 301; P G Hall (1962), p. 39.
57. J Lewis (1984), p. 149.
58. P G Hall, op. cit, pp. 41-8.
59. M Glucksmann (1990), p. 217 and pp. 220-2.
60. P G Hall, op.cit, pp. 121-34.
61. Polytechnic prospectus, 1922-35, Number 51 on photography, University of Westminster Archives.
62. Girl's Realm (1902), p. 76.
63. J Burstyn (1980), p. 120.
64. N Ferguson (1975), pp. 55-7.
65. Central Bureau for the employment of women (Undated, BL catalogue suggests 1910), p. 69.
66. P G Hall, op.cit, pp. 121-34.

## CONCLUSION

There is a wealth of information regarding women's experiences in Britain in the period 1870 to 1913. It is well documented that educational opportunity was poor for women compared with men, and that they struggled to enter various establishments, and then encountered numerous hindrances once there. Working-class women faced stereotyping within their curricula, especially after a study of domestic science was made compulsory for schoolgirls in 1878,<sup>1</sup> and the subjects which they were offered within adult education at such establishments as the mechanics institutes and the newly emerging polytechnics also had a distinct domestic bias. At university level, women were prevented from choosing certain options because they were not deemed 'appropriate', engineering and medicine being good examples, and on a wider level, faced exclusion from social activities and societies, which made their educational experiences less complete than those of their male peers. Carol Dyhouse has proposed that in spite of such obstacles, education was the field in which opportunities for women were the most promising in late Victorian Britain and that greater strides were made here than in other areas of social life.<sup>2</sup> Nevertheless, the successes of such women have rarely been demonstrated, and a number of significant achievements made by women still require excavation.

This thesis has demonstrated that at both U.C.L. and the polytechnic at Regent Street women played an important part. Rarely have educational establishments been subjected to statistical scrutiny as in this research, and the result has been a generalised view of women's position in higher and further education which is not necessarily accurate. The findings of this thesis suggest that more detailed case studies of individual institutions are required in order that a clearer picture of women's role can be established. U.C.L. provides a valuable example that women persevered and succeeded in gaining high level qualifications in the four decades

before the First World War, during a period in which many British universities were still contemplating opening their doors to women, and in which large numbers of female students and graduates are not perceived to have been the norm. Not only were women present in significant numbers, but they also comprised a large portion of the student body, even in subjects such as science, where they accounted for over thirty per cent of total students, in spite of the fact that a number of options were closed to them.<sup>3</sup> Such subjects are believed rarely to have been studied by women, especially if they were of upper middle-class status, and not expected to follow a vocation.<sup>4</sup> It has also been shown that women accounted for a very significant proportion of arts graduates up to 1914, over forty one per cent on average, and at points comprised the majority. There is no clear evidence that such qualifications were non-vocational, or dilettante, especially given that fine art students from the Slade School were not included in the figures. It should not be assumed, without further research into the post-graduate activities of these arts graduates that women chose such subjects out of amateur interest alone. The finding that female participation at U.C.L. was significant before the First World War contradicts the accepted view that women did not make great inroads into higher education at this time. Thus, even as an individual case it is important. It also indicates the need for more detailed research into the numbers and proportions of women in other universities and colleges.

In spite of a number of data inadequacies, it also appears that working and lower middle-class women succeeded in establishing themselves in adult education by attending the polytechnic at Regent Street in surprisingly large numbers before 1914. According to an L.C.C. source, women comprised the large figure of over forty four per cent of the student body at the polytechnic. Although this information was only available for one year, 1908-1909, the same source quoted female rates of participation at all other London polytechnics for the same year. Two notable examples, where the proportion of women exceeded those

at Regent Street were the Northern polytechnic, where 48.4 per cent of students were female, and the South Western, where women comprised the majority at fifty eight per cent. Other institutions had lower, but still significant rates, and the average female participation across ten London polytechnics was just over thirty five per cent.<sup>5</sup> This finding is innovative, not because it 'disproves' any existing theory, but because it exposes an area of education in which women did not just play a large role, but were an integral part. Oddly, in most histories of technical training, women are not mentioned, and therefore, the implicit assumption is that they played a marginal role. This was, as demonstrated from the findings at U.C.L. and Regent Street, quite clearly not the case. In addition, although the women who attended the polytechnic were offered prescribed courses which can loosely be described as 'domestic' or related to traditional areas of female employment, they showed a distinct lack of enthusiasm for such routes, opting more commonly for science subjects such as physiology, hygiene and botany, technical art courses and even formed a significant proportion of agricultural students. A number of the art and design courses in which they participated were directly vocational, industrial design and woodcarving for example, which emphasises that arts subjects should not be considered as a form of training which was irrelevant to or rarely led to careers in industry. The relevance of such subjects to industrial employment, and the success of women in securing such posts were not necessarily comparable however, as will be shown later.

For the interwar period there is less of a research base regarding women's education. Thus, the findings from U.C.L. and the polytechnic for the 1920s are not so clearly set within an existing framework. The historiography relating to education generally in this period talks of a stagnation in educational opportunity, or an era of 'creeping growth'.<sup>6</sup> Detailed research however, has shown that significant advances were made, especially in adult and polytechnic provision.<sup>7</sup> Probably the single most important statement made in relation to

women's role in this process, which has been made by Halsey, is that their proportional participation as university students declined between 1920 and 1939, implying that women lost the foothold that they had gained in the Victorian and Edwardian eras.<sup>8</sup> This view has been criticized for referring primarily to full-time students, because women's participation as part-time students gradually increased after the 1920s, and also for not comparing like with like. The figures presented by the University Grants Committee (U.G.C.) on which Halsey's discussion is based, included Oxford and Cambridge in 1929-30 but not in 1919-20, which helps to explain why women's proportion of the total university population of Britain looked higher in 1920 than later. This does not mean, however, that women's participation had genuinely declined. If the Oxbridge figures are excluded in the later period, the female percentage of total students actually grew.

The findings from U.C.L. are of value to this debate because women's participation, both numerically and proportionately grew in all areas during the 1920s. Women comprised virtually half of the student body in this period, and accounted for thirty six per cent of science students. Thus their participation was growing at a faster rate than men's and their involvement had risen on pre-war levels. With the exception of Oxford and Cambridge, this appears to have been the case in most other British universities. That said, the proportional growth of women as students at U.C.L. was almost entirely in areas in which they had participated before the war, science and particularly arts subjects, although the enthusiasm with which they embraced the new courses in journalism and librarianship was notable. However, the BA degree could be gained by studying a range of science subjects such as chemistry, zoology and botany, thus the classification of subjects as 'sciences' or 'arts' obscures more than it reveals about female subject choices, and the conclusion can easily be reached, probably incorrectly, that a large number of women studied the arts, because they did not have career aspirations. Their participation remained low in areas such as



engineering and law, even though the option to study such courses was made available after 1917. Given that women continued to enrol in ever increasing numbers in other areas of the curriculum, many of them vocational, and not necessarily 'traditional', it appears that they deliberately chose not to study such courses, but rather opted for other areas of the curriculum. This is not surprising when one considers the enormous restrictions which women faced when attempting to secure employment in fields such as engineering.<sup>9</sup> Very few women seem to have desired to confront such obstacles simply because they were there. Presumably, the availability of a number of other qualifications which could lead to interesting and rewarding careers made the option of engineering singularly unattractive, although a handful of women did succeed in gaining very high level qualifications in this area.

A similar case was true of women who studied at the polytechnic. Although their rates of participation on practical trade courses increased a little on pre-war figures, they still seemed unwilling to enrol in large numbers on male dominated courses such as brickwork, carpentry and joinery, mine surveying or brewing, or more accurately, were prevented from doing so by the continuance of the rule that a candidate must be employed in the trade in which he or she wished to train. Given that in 1925 there were 110,714 apprentices in Britain, of whom only 6,065 or 5.5 per cent were female, it is not surprising that so few women were attracted to practical training.<sup>10</sup> In addition, although a number of 'new' manufacturing industries recruited women often in preference to men during the 1920s, they were situated mainly on the outskirts of London and thus if their employees wished to obtain training, Regent Street was not the most practical location for them to do so.<sup>11</sup> Even for those female manufacturing workers who worked within a close distance of Regent Street, it seems that the incentive to obtain skills and qualifications was slight when industries such as electrical engineering, rayon manufacture and vehicle construction employed women almost entirely

in subordinate positions with low wages, little chance of promotion and in many cases a bar once married.<sup>12</sup> Curiously, women were not inclined to study in large numbers the domestic subjects such as cookery, needlework and dressmaking designed for them either. Thus, although they did not break into distinctly 'male' educational fields, they were not content to study courses which would lead them into accepted female occupations either. Women's participation continued to grow in areas such as pure science and the arts, but they were also attracted to new areas of the curriculum such as journalism, commerce and photography. In these areas they comprised a significant proportion, demonstrating that they were not content only to follow 'traditional' routes, but rather pursued qualifications which would lead to interesting careers whilst not offering enormous obstacles.

Given the interest which these women seem to have shown for gaining education and qualifications which would enhance their employment prospects and the impressive activities of U.C.L.'s science graduates after they left the college, it seems that British industry missed out by failing to attract highly qualified women who had relevant skills and expertise. Before the First World War, teaching was the most popular employment amongst U.C.L.'s science graduates, accounting for the occupations of seventy one per cent of those who could be traced, although the types of work in which they were involved, secondary teaching, higher education, teacher training and headships were demanding and competitive. It is certainly impressive that forty seven per cent of these teachers were lecturers in higher education establishments, and thus involved in a field of employment which has been portrayed as non-traditional for women. In addition, those who taught in schools were all secondary teachers, the majority subject specialists. Research and medicine were also popular career choices, although most female researchers stayed within the more supportive world of academia or engaged in government research. Few entered private industry, or highly technical occupations, exceptions being Winifred Brenchley who was head of botany at the Rothamsted

Experimental Station between 1907 and 1948<sup>13</sup> and Dame Harriett Chick who was a member of the scientific staff of the Lister Institute between 1905 and 1946 after a career in sanitary research which stemmed back to 1899.<sup>14</sup> U.C.L.'s graduates thus appear to have been affected by social conventions regarding respectable employment, although prejudices within private industry were such that many educated women were forced to enter these traditional occupations, not through choice. Deane and Cole have argued for example that women were rarely employed in highly paid or technical posts in industry before the First World War, the majority remaining in subordinate positions.<sup>15</sup> Thus the incentive to fight for entry was low.

This was also demonstrated by the apparent career aspirations of students who studied at the polytechnic. It has been shown that before the First World War, a much larger proportion of female students, 23.3 per cent of their cohort were engaged in manufacturing work than were involved in practical trade courses at the polytechnic, only 4.5 per cent. Thus these women wished to procure non-manufacturing skills, essentially in science and arts subjects. This may be an indication of a desire for enhanced social status. However, it is almost certainly an expression of a number of significant obstacles within manufacturing industry, such as low pay, poor prospects for promotion, dull repetitive work and minimal chances of gaining an apprenticeship which made industrial occupations an unattractive choice for women and encouraged many to gain alternative qualifications. An important finding from both U.C.L. and the polytechnic, is the extent to which women were economically active during and after their studies, demonstrating that although they faced many barriers within the labour market they were able to use their qualifications to secure challenging and interesting careers and were not content to lead 'leisured' lifestyles. The greatest loss thus seems to have been on the part of industry.

The situation seems to have been much the same after the war, when again the majority of U.C.L.'s science graduates, sixty eight per cent, entered the teaching profession. This high level of participation was probably a reflection of the introduction of the Board of Education's grants to intending teachers from 1910,<sup>16</sup> which offered a means of funding to women who would not previously have afforded a higher education, but stipulated that they must become school teachers after finishing their studies. Only thirty per cent of those who became teachers after the war entered academia, signifying that the number who were becoming school teachers was growing. This was in spite of the re-introduction of the marriage bar by many Local Education Authorities during the 1920s which lowered the attractiveness of the profession to educated women.<sup>17</sup> In addition health authorities and the civil service began targeting married women during the 1920s,<sup>18</sup> which meant that unlike the pre-war era, public sector employment was no longer an attractive proposition for women. The implication is that it was still more favourable than private industry however, given the large number of women who became teachers and that seven gained high civil service positions, admittedly most gaining seniority after the interwar period. This was in spite of the fact that after the war there was a significant growth of newer 'light' scientific industries, which required highly skilled staff.

There were exceptions, for example, Kathleen Gough became chief physicist with the Dubilier Condenser Company,<sup>19</sup> another of U.C.L.'s graduates succeeded as chief engineer with the Ministry of Imperial Aviation<sup>20</sup> and another became a consultant analyst with Lever Brothers.<sup>21</sup> However such women were in the minority, although their successes in a highly unfavourable climate were praiseworthy. It appears that the vast majority of these women were career minded, and that they were in no way averse to employment. In contrast, they positively sought it. Thus it seems that British firms and businesses failed to attract a major source of skill. The existence of the marriage bar, closed apprenticeships, poor chances of

promotion and low pay, coupled with the financial incentive offered by the Board of Education to those who pledged to teach, encouraged educated women to seek employment elsewhere. This was also the case at the polytechnic where during the 1920s there was an increasing tendency for female students to enrol on science and arts courses and to avoid both traditionally 'female' subjects such as dressmaking and cookery and courses of practical industrial training. In contrast they embraced new areas of the curriculum such as commerce, photography and journalism. Whilst this demonstrates an interest in non-traditional careers, it also indicates that women avoided those areas of work which were perceived to be vital to the health of the economy, essentially the new manufacturing industries in which they still tended to be employed in lowly positions. They increasingly chose, or were forced to take their skills elsewhere, which meant that a significant group of intelligent people were simply not utilised to the full. It appears in conclusion that there has indeed been a 'neglected issue' in the debate surrounding the performance of the British economy, and the role of education and training: women.

## NOTES TO CONCLUSION

1. C Dyhouse (1977), p. 21.
2. C Dyhouse (1978a), p. 77.
3. See table 3.3.
4. M Sanderson (1972), pp. 314-5 and pp. 337-8.
5. L.C.C., Education Committee Minutes (1910), p. 679.
6. See for example, C Barnett (1986), p. 210, p. 218 and p. 223; P Gordon, R Aldrich and D Dean (1991), pp. 59-60; M Sanderson (1988), p. 43.
7. This view is outlined in chapter seven. A H Halsey (1972), p. 205 also notes that in further education, between 1910 and 1967 women increasingly began to dominate numerically.
8. Ibid, pp. 203-4.
9. M Sanderson, op. cit., p. 322 and p. 336; W J Reader (1987), p. 160.
10. M Bartlett (1995), p. 121.
11. P G Hall (1962), pp. 121-34.
12. M Glucksman (1990), pp. 220-2; D C Coleman (1969), p. 430; R E Catterall (1979), pp. 253-4.
13. See appendix B, number 8 and Who Was Who, vol. 5, 1951-60; Hutchinson's Woman's Who's Who (1934), p. 81; Shaw's Women's Who's Who (1934), p. 87; Who's Who in British Science (1953), p. 39.
14. See appendix B, number 13 and Who Was Who, vol. 7, 1971-80; Who's Who in British Science (1953), p. 55; Shaw's Women's Who's Who (1934), p. 114; Hutchinson's Woman's Who's Who (1934), p. 112.
15. P Deane and W A Cole (1969), p. 144.
16. SPR. MIC. E. 291, parliamentary papers, 1911, LIX, pp. 2-6 of section beginning p. 17, British Library; C Dyhouse (1995), p. 20.
17. C Dyhouse (1989), pp. 79-80.
18. Ibid; M Zimmeck (1984), p. 905.
19. Institute of Physics, List of Members (1962), p. 149.
20. Index card and student record SR 166, U.C.L. Records Office.
21. This information was obtained from the index cards in U.C.L.'s Records Office.

# APPENDIX A

## FEMALE BSC GRADUATES AND BREAKDOWN OF COURSES STUDIED, 1885-1891

Student, by Number	Date of Enrolment	Course 1	(fee)	Course 2	(fee)	Course 3	(fee)	Course 4	(fee)	Course 5	(fee)
No.1 Age 21	21.10.85	Physics	£11,11s	Physics Exercises	£2,2s	Botany	£5,5s				
	17.05.86	Botany	£9,19s 6d								
	25.10.86	Pure Maths	£10,10s	Physics	£9,9s	Physics Lab.	£5,5s	Botany	£12,12s		
No.2 Age 20	25.03.86	Physics	£3,13s 6d								
	27.01.87	Pure Maths	£3,3s								
	10.05.87	Applied Maths & Mechanics	£3,3s								
No.3 (Age not given)	29.01.86	Geology/ Mineralogy	£4,4s								
	25.01.88	Geology/ Mineralogy	£4,4s								
No.4 Age 'over 21'	27.10.86	Chemistry	£6,6s								
	12.05.87	Analytical Chemistry	£2,12s 6d								
	04.07.87	Analytical Chemistry	£2,12s 6d								
No.5 Age 25	14.01.86	Latin	£3,13s 6d	English	£1,1s	French	£1,11s 6d	German	£2,12s 6d	Physics	£2,2s
	02.04.86	English	£1,1s	French	£1,11s 6d	Physics	£2,2s	Practical	£7,7s	Zoology/ Anatomy	£10,10s
	18.10.86	Pure Maths	£10,10s	Physics	£6,6s	Physics Exercises	£2,2s	Chemistry			
	12.05.87	Practical Botany	£4,4s								
	20.10.87	Philosophy	£5,5s								
	03.05.88	Botany	£3,13s 6d								
	17.10.88	Botany	£15,15s								
No.6 Age 22	25.03.86	Advanced Inorganic Chemistry	£2,2s								
	20.10.86	Chemistry	£6,6s								
	26.10.86	Botany	£12,12s								
	20.01.87	Geology/ Mineralogy	£4,4s								

Student, by Number	Date of Enrolment	Course 1	(fee)	Course 2	(fee)	Course 3	(fee)	Course 4	(fee)	Course 5	(fee)
No.7 Age 20	31.03.86	Physics Lab.	£2,12s 6d								
No.8 Age 20	19.01.86	Geology/ Mineralogy	£4,4s								
	27.01.86	Chemistry	£1,1s								
	13.10.86	Chemistry	£6,6s								
	18.01.87	Geology/ Mineralogy	£4,4s								
	19.01.88	Pure Maths	£4,4s								
	10.05.88	Pure Maths	£4,4s	Chemistry	£2,12s 6d	Geology/ Mineralogy	£2,2s				
	05.04.89	Analytical Chemistry	£10,10s	Chemistry	£2,12s 6d						
	20.03.90	Analytical Chemistry	£6,6s								
No.9 Age 21	16.01.90	Practical Inorganic Chemistry	£4,4s								
	24.01.88	Zoology & Anatomy	£10,10s								
	03.05.88	Practical Botany	£7,7s								
	17.10.88	Philosophy	£5,5s	Advanced Physiology (Practical)	£5,5s						
	24.10.88	Geology/ Mineralogy	£1,1s								
	18.01.89	Geology/ Mineralogy	£4,4s								
	15.10.86	Practical Chemistry	£7,7s								
No.10 Age 19	17.10.87	Zoology/ Anatomy	£21								
	20.10.88	Zoology/ Anatomy Lab.	£1,11s 6d	Practical Botany Advanced Physiology (Practical)	£7,7s £5,5s	Geology/ Mineralogy	£7,7s				
	26.11.88	Zoology/ Anatomy	£2,2s								
	16.01.89	Botany	£1,11s 6d								
	03.04.89	Botany	£3,3s								
	27.05.89	Zoology/ Anatomy Lab.	£2,2s								



Student, by Number	Date of Enrolment	Course 1	(fee)	Course 2	(fee)	Course 3	(fee)	Course 4	(fee)	Course 5	(fee)
No.11 (Age not given)	19.01.87	Geology/ Mineralogy	£4,4s	Geology/ Mineralogy	£2,2s						
	25.01.88	Pure Maths	£4,4s								
	19.04.88	Pure Maths	£4,4s								
No.12 Age 18	23.10.85	French	£6,6s	Physics Practical Chemistry	£5,5s £4,4s			Zoology/ Anatomy	£10,10s		
	11.01.86	English	£2,2s								
	25.03.86	Pure Maths	£2,12s 6d	Physics	£6,6s						
	15.10.86	Pure Maths	£10,10s								
	10.05.87	Practical Botany	£7,7s	Chemistry	£7,9s						
	10.10.87	Physics	£4,4s								
	23.04.91	Philosophy	£2,2s								
	07.12.91	Physiology	£3,3s								
No.13 (Age not given)	21.10.85	Pure Maths	£10,10s	Physics (Exercises)	£10,10s £4,4s	Chemistry	£7,7s	Zoology/ Anatomy	£10,10s	Practical Botany	£4,4s
	22.01.86	Physics	£2,2s								
	20.03.86	Physics	£2,2s								
	18.05.86	Botany	£3,3s								
	31.01.87	Inorganic Practical Chemistry	£4,4s								
	10.05.87	Zoology/ Anatomy	£2,2s	Physics Physics & Lab.	£7,7s £8,8s						
	22.10.88	Pure Maths	£10,10s								
	11.10.89	Pure Maths	£5,5s								
	08.12.90	Pure Maths	£3,3s								
	13.02.91	Pure Maths	£1,1s								
	06.06.91	Botany	£1,11s 6d								

Student, by Number	Date of Enrolment	Course 1	(fee)	Course 2	(fee)	Course 3	(fee)	Course 4	(fee)	Course 5	(fee)
No.14 Age 28	19.01.88	Pure Maths	£4,4s								
	27.01.88	Practical	£4,4s								
		Inorganic									
	08.05.88	Chemistry	£4,4s								
	10.10.88	Pure Maths	£4,4s	Physics	£1,11s 6d						
		Pure Maths	£10,10s	Physics	£8,8s	Physics Exercises	£2,2s	Chemistry	£7,7s	Zoology/ Anatomy	£10,10s
	03.04.89	Botany	£7,7s								
	10.10.89	Philosophy	£5,5s	Physics	£7,7s	Botany	£15,15s				
	22.10.89	Physics & Lab.	£5,5s								
	01.12.90	Practical	£5,5s								
		Physics									
	14.01.91	Logic	£2,2s	Botany Lab.	£4,14s 6d	Physiology	£2,2s				
	28.04.91	Philosophy	£2,2s	Botany	£2,2s						
	21.03.92	Botany	£1,1s								

**Source:** College fees books, faculty of arts, science and laws, 1885-91, U.C.L. Records Office.

## APPENDIX B

### THE LATER ACTIVITIES OF U.C.L.'s FEMALE SCIENCE GRADUATES FROM 1880

NG = Name not given, in order to preserve confidentiality where the graduate in question does not have records in the public domain.

<u>Student Name</u>	<u>Academic Work</u>	<u>Other Employment</u>
(1) BAILES, Alice		1908-17: Teacher, Central School for girls. 1917-20: Borough polytechnic. 1920-26: Lady Eleanor Holles' School, Hackney. 1926: Physics mistress, Paddington and Maida Vale High School. <sup>1</sup>
(2) BAKER, Sarah M	1913: DSc Botany	1913-16: Quain researcher in botany, U.C.L. <sup>2</sup>
(3) BENSON, Annette M	1890: MB 1893: MD Member: B.I.P., S.P.R., R.I.G.B.	1895: Senior medical officer, Cama hospital, Bombay. 1900: First physician, Cama hospital, Bombay. <sup>3</sup>
(4) BENSON, Margaret J	1894: DSc (London) Fellow U.C.L. F.L.S. Member: B.F.U.W.	1893-1922: Senior Lecturer in botany, Royal Holloway, and head of department. 1904: Examiner for BSc botany, London University. 1906: Examiner for the Royal Holloway. 1912-1922: Professor of botany at University of London. Large number of publications between 1894 and 1918 on embryology and botany. <sup>4</sup>
(5) BINDEN, Lizzie		Assistant mistress, Abbeydale Girls Secondary School, Sheffield. <sup>5</sup>
(6) BOSANQUET, Theodora	1926-7: Course in Norwegian, U.C.L.	1919: M.B.E. 1917-18: Secretary to Henry Jones, O.M. 1918-20: Assistant to war trade intelligence department. Assistant to secretary, Ministry of Food, literary editor, 'time & tide'. Publications (mainly literary). Executive Secretary, I.F.U.W. <sup>6</sup>
(7) BRAMWELL, Amy B	1891: PhD	1893: Maria Grey Training College. 1897: London Day Training College. 1906: Headmistress, County Secondary School, Eltham and publications. <sup>7</sup>
(8) BRENCHLEY, Winifred E	1911: DSc Botany F.L.S., F.R.E.S. Fellow U.C.L. Diploma, Swanley Horticultural College Member: E.S, Ent. Soc., A.E.B., L.A., B.F.U.W., S.A.P.	1948: O.B.E. 1907-48: Head of Botanical department, Rothamsted Experimental Station. Numerous publications between 1921 and 1949. <sup>8</sup>
(9) BUCHANAN, Florence	1902: DSc Physiology Fellow U.C.L.	1892-1906: Lecturer, Zoology, Royal Holloway. 1892-98: Staff, Zoological Record 1895-96: Part-time curator, Zoological Department, Oxford University Museum. 1896-1905: Research assistant to Sir J Burdon-Sanderson. 1906: Royal Society Grant for independent research. <sup>9</sup>

(10)	BUER, Mabel C	DSc Economics Member: B.F.U.W., L.A.	Lecturer in economics, University of Reading. Lecturer, L.S.E. Publications - economics texts. <sup>10</sup>
(11)	NG	1898: MB	County borough organiser WRVS 1944
(12)	CHICK, Edith		1899-1902: Quain research student, U.C.L. 1900: Assistant, botanical museum, U.C.L. 1901: Two publications on botany. <sup>11</sup>
(13)	CHICK, Harriett (Dame)	1903: DSc Honorary fellow, Royal Society of Medicine Fellow U.C.L. Honorary DSc, Manchester Member: B.F.U.W. 1926-59: Founding member and president of the Nutrition Society. 1925-45: Secretary to Food Committee of the Medical Research Council 1934-37: Secretary to the League of Nations Health Section Committee.	1899: Chemist on the Sanitary Commission 1900: Bacteriology researcher, Liverpool. <sup>12</sup> 1932: C.B.E. 1949: D.B.E. 1905-46: First female member of the scientific staff of the Lister Institute. (Honorary member to 1970). Publications in physiology and biochemistry. <sup>13</sup>
(14)	CLARKE, Lillian J	DSc F.L.S.	1906: Examiner for botany matriculation, University of London. 1910: Botany teacher, Battersea polytechnic. <sup>14</sup> Formerly headmistress of James Allen's School for girls, Dulwich. Died, 1913. <sup>15</sup>
(15)	COLLINS, Lydia M		1913: Assistant mistress, County Secondary School, Chelsea. Maths mistress, County Secondary School, Peckham. <sup>16</sup>
(16)	COOPER, Elizabeth BC		1913 Assistant mistress, County Secondary School, Twickenham. <sup>17</sup>
(17)	CUNNINGHAM, Mary	1915-16: MSc Chemistry	1920: C.B.E. Voluntary and ambulance work during 1st World War. <sup>18</sup>
(18)	NG	1919: PhD	1914-20: Research assistant in eugenics, U.C.L.
(19)	DILLER, Alice		1913: Assistant mistress, Grammar School, Ashburton, Devon. <sup>19</sup>
(20)	FILDES, Amy F	1922: DSc psychology	1927: Vice Principal and lecturer in psychology, Hockerill Training College. <sup>20</sup>
(21)	FRASER, Elisabeth	1918: DSc 1924: Fellow, U.C.L.	1918-1923: Research assistant in Zoology, U.C.L. 1924-31: Senior lecturer in Zoology. 1932-1940s: Reader in Zoology/Comparative Anatomy, U.C.L. <sup>21</sup>

(22)	FRODSHAM, Ethel	1905: Cambridge tripos in natural sciences. 'Chadwick training course in school hygiene', U.C.L. Member: A.U.W.T., A.W.S.T., Training College Association.	1909-15: Lecturer, Warrington training college. 1915-21: Furzedown training college 1921: Science mistress, County Secondary School, Sydenham. <sup>22</sup>
(23)	GAZDAR, Maud	MD in midwifery/ diseases of women	1908-10: Demonstrator in chemistry, U.C.L. 1914: Lecturer in morbid histology, London School of Medicine for Women. Publications with Ramsay. <sup>23</sup>
(24)	GIBSON, Winifred	1906: Presented paper to Royal Astronomical Society. <sup>24</sup>	
(25)	GOODYEAR, Edith		1904-16: Geology museum assistant, U.C.L. 1917-20: Research assistant in geology, U.C.L. 1921-29: Senior geology assistant, U.C.L. 1930-41: Lecturer in geology. <sup>25</sup>
(26)	HALKET, Ann C	1938: DSc	1913: Lecturer in botany, Bedford College. <sup>26</sup>
(27)	HETT, Mary L	F.Z.S., Member A.U.W.T., British Association	1914: Lecturer in Zoology, Bedford College. <sup>27</sup>
(28)	HOMFRAY, Ida	1910: DSc chemistry	1900: Research assistant, U.C.L., Working on a research project for the Sewage Commission. 2 Publications. <sup>28</sup>
(29)	HUDD, Winifred F		1910: Assistant mistress, nature and hygiene, Croydon Secondary School for girls. Lecturer in science, City training college, Manchester. Science Lecturer at training college, Norwich. <sup>29</sup>
(30)	JACKMAN, Esther B	Member: London Mathematical Association	1908-10: Dover County School 1912-17: Mathematics mistress, Croydon borough school for girls. 1917: Mathematics specialist, Sir William Perkins School, Chertsey. <sup>30</sup>
(31)	KELLY, Eva		1900: Chemical and Zoological research, Munich. <sup>31</sup>
(32)	KEMPSON, Dora M		1913: Science mistress, girls' grammar school, Maidstone. <sup>32</sup>
(33)	LANE-CLAYPON, Janet E	1905: DSc Physiology 1907: MB 1910: MD (London School of Medicine)	1908-12: Member of the Lister Institute 1912: Lecturer in hygiene and physiology, Kings College London. 1904: One co-authored publication. <sup>33</sup>
(34)	LYON, Julia	1912: Teacher's Diploma Member: A.A.M., Mathematical Association, B.P.A., Aristotelian Society.	1914-16: Municipal Secondary School, Norwich 1916: County Secondary School, Tottenham. <sup>34</sup>

- (35) MARSHALL, Dorothy BL  
1896-1897: Four publications  
1897-1906: Resident lecturer in natural science, Girton college, Cambridge.  
1906-07: Senior science lecturer, Avery Hill Training College.  
1909-13: Senior science mistress, Huddersfield High School.  
1913: Chemistry mistress, Clapham high school.<sup>35</sup>
- (36) MIALI-SMITH, Gladys M MB/BS London  
DSc  
M.R.C.S./L.R.C.P.  
D.P.H.  
Member: M.W.F.  
1918-19: Assistant surgeon, Scottish women's hospital.  
1920-21: Assistant medical officer, maternity and child welfare, St. Pancras.  
1922: General practitioner, Welwyn Garden City.<sup>36</sup>
- (37) MILES, Ivy M  
1912: Board of Education Training Certificate  
1917: London Teaching Diploma  
1913-21: Science mistress, Winchester County Girls School.  
1922-23: Girls' High School, Dorking.  
1923: Botany mistress, County School for girls.<sup>37</sup>
- (38) MOLL, Winifred A  
1910-11: Assistant mistress, Victoria College, Belfast  
1913: Science mistress, County School, Dartford.<sup>38</sup>
- (39) MUNRO, Madeleine  
Geological researcher.  
Lecturer, Bishops Otter College, Chichester.<sup>39</sup>
- (40) NEWTON, Celia  
1900: Chemical researcher, U.C.L.<sup>40</sup>
- (41) PARKER, Katherine  
1917: DSc  
1914-17: Zoology assistant, U.C.L.<sup>41</sup>
- (42) PATCH, Winifred S  
1896: MB  
1898: MD (London School of Medicine)  
1896: on the register of medical women  
1900: Resident medical officer, North West Fever Hospital.<sup>42</sup>
- (43) PIDOUX, Kezia C  
Academic diploma in geography  
Board of Education Training Certificate  
Member: Geographical Association  
1912-18: LCC Central Schools  
1918-25: Winchester County School  
1925: Assistant mistress, Worcester City Secondary School<sup>43</sup>
- (44) PIPER, Gladys E  
Lecturer in science, Graystoke Place Training College, London.<sup>44</sup>
- (45) NG  
1922: MSc botany
- (46) PRANKERD, Theodora L  
1930: DSc botany  
Member: Convocation London University, British Association, Linnean Society, Royal Institution  
1907: Stockwell Secondary School.  
1912: Departmental library assistant, U.C.L. and assistant demonstrator in botany, Bedford College.<sup>45</sup>  
Lecturer, University of Reading  
Committee member/speaker, League of Nations Union Chair, Women's Freedom League, Reading and publications.<sup>46</sup>
- (47) RAISIN, Catherine  
1898: DSc  
Fellow U.C.L.  
Fellow, Geological Society  
Member, Geologist's Association  
Founder of the Somerville Club  
1890-1920: Head of Department of Geology, Bedford College (first in Britain).  
21 research papers in mineralogy.<sup>47</sup>

(48)	RAND, Ethel A		1913-17: Maths mistress, County School, Sittingborne. 1924: Assistant secretary to appointments board for women (University of London) <sup>48</sup>
(49)	READ, Bertha		Assistant mistress, Girls' grammar School, Lancaster. <sup>49</sup>
(50)	REANEY, Mabel J	Course in applied statistics for teachers	Assistant mistress, Hatcham Girls' School, New Cross, London. <sup>50</sup>
(51)	NG		M.B.E.
(52)	ROBERTSON, Agnes	1905: DSc Fellow U.C.L. F.L.S.	1903: Quain research student, U.C.L. 1905: Lecturer in botany, U.C.L. <sup>51</sup>
(53)	NG	Course in phonetics for missionaries	Missionary
(54)	SIDE, Gladys A		Assistant mistress, Municipal Secondary School, Devonport. <sup>52</sup>
(55)	SIMMONS, Dorothy M	MB/ChB	Assistant medical officer, Salford. <sup>53</sup>
(56)	SKELTON, Ruth F		1919-22: President, Women's union of scientists. 1911-24: Lecturer in physiology, U.C.L. <sup>54</sup>
(57)	SMITH, Winifred		1913-1925: Lecturer in taxonomy, U.C.L. <sup>55</sup>
(58)	STARLING, Florence, L		Assistant mistress, County School, Folkestone. <sup>56</sup>
(59)	STOPES, Marie CC	1905: DSc. PhD F.L.S., F.G.S., F.R.S.L.	1904: Assistant/demonstrator in botany, Manchester University 1910: Lecturer in palaeobotany, Manchester 1910: Gains grant from Royal Society to carry out botanical research in Japan. Lecturer at Imperial University Tokyo Founder and Member, Coal Research Club 1913-1920: Lecturer in palaeobotany, U.C.L. <sup>57</sup> 1921: founded mother's clinic for constructive birth control (first in the world). Publications re: botany and later contraception and birth control. <sup>58</sup>
(60)	STORR, Lilian A		Assistant mistress, County High School, Retford. <sup>59</sup>
(61)	TALBOT, Gertrude M		1904: Lecturer in physics, Cheltenham Ladies College. <sup>60</sup> Head of botany department, James Allen's Girls' School, East Dulwich. <sup>61</sup>
(62)	TCHAIKOVSKY, Barbara	MB/BS 1908: MD PhD Cambridge D.P.H.	1899: Junior demonstrator, Bedford College. 1900: Demonstrator in chemistry and Junior assistant in mathematics. <sup>62</sup> House physician and anaesthetist, Royal Free Hospital Assistant School Medical Officer, L.C.C. London University, Gold Medal in State Medicine. Propagandist in Child Welfare. <sup>63</sup>

- |      |                   |   |  |
|------|-------------------|---|--|
| (63) | THOMAS, Ethel N   | 1915: DSc botany<br>Fellow U.C.L.<br>F.L.S.   | 1900: Botany researcher at the Royal College of Science<br>1905-7: Assistant/demonstrator at U.C.L.<br>1908-15: Botany lecturer, U.C.L.<br>1915: Reader in botany and head of department U.C.L. <sup>64</sup><br>Head of department of botany, Leicester/University of South Wales<br>Head of botany, National Museum of Wales<br>Member of executive of botanical conference<br>Vice president, botany section of British association<br>Honorary director, botanical trust research laboratories<br>Pathological research for war office and medical research committee<br>President, Federation of University Women, Leicester branch<br>Representative to international council in America<br>Numerous publications. <sup>65</sup> |
| (64) | TRIBE, Margaret   | 1916: MSc Zoology<br>DSc Embryology 1923<br>Recognised teacher of London University   | 1913: Demonstrator in physiology, London School of Medicine for Women.<br>Lecturer in Zoology, Kings College, London.<br>Warden of Kings College Hostel for Women. <sup>66</sup>   |
| (65) | WADSWORTH, Marian | Member: A.A.M   | 1911: Science and geography mistress, County School, Ashford, Kent. <sup>67</sup>  |
| (66) | WHITE, Sarah E    | 1896: MB (London School of Medicine)<br>Member: N.S.L.R.,<br>M.D.U.P.I., Homeopathic Association, 'Hospital versus asylum', Mental Welfare, Society of Friends. <sup>68</sup> |  |

**Source:** Index cards, student records and college calendars, U.C.L. Records Office; Who Was Who, 1920-1980; Hutchinson's Woman's Who's Who 1934; Shaw's Women's Who's Who, 1934; Who's Who in British Science, 1953; Directory of Women Teachers, 1914 and 1927; Englishwoman's Yearbook, 1896-1916.



## NOTES TO APPENDIX B

1. Directory of Women Teachers, 1927, p. 18.
2. College calendars, 1913-16, U.C.L. Records Office.
3. Englishwoman's Yearbook, 1896, p. 154 and 1901, p. 125; Hutchinson's Woman's Who's Who, 1934, p. 62; Shaw's Women's Who's Who, 1934, p. 70.
4. Englishwoman's Yearbook, 1899, p. 111; 1901, p. 136; 1905, p. 132; 1907, p. 149 and every year to 1916; Directory of Women Teachers, 1914, p. 21; Hutchinson's Woman's Who's Who, 1934, p. 63; Shaw's Women's Who's Who, 1934, p. 70; Who Was Who, Vol. 3, 1929-40.
5. Directory of Women Teachers, 1927, p. 39.
6. Who Was Who, Vol. 6, 1961-70; Hutchinson's Woman's Who's Who, 1934, p. 74; Shaw's Women's Who's Who, 1934, p. 81.
7. Directory of Women Teachers, 1914, p. 28; 1927, p. 51.
8. Who was Who, Vol. 5, 1951-60; Hutchinson's Woman's Who's Who, 1934, p. 81; Shaw's Women's Who's Who, 1933, p. 18; 1934, p. 87; Who's Who in British Science, 1953, p. 39.
9. Englishwoman's Yearbook, 1907, p. 151, and every year to 1916; Hutchinson's Woman's Who's Who, 1934, p. 32.
10. Who Was Who, Vol. 4, 1941-50; Hutchinson's Woman's Who's Who, 1934, p. 90; Directory of Women Teachers, 1927, p. 62.
11. Englishwoman's Yearbook, 1901, p. 137; 1902, p. 127; 1905, p. 134; College calendar, 1899, U.C.L. Records Office.
12. Englishwoman's Yearbook, 1899, p. 109; 1901, p. 129; 1904, p. 125.
13. Who Was Who, Vol. 7, 1971-80; Who's Who in British Science, 1953, p. 55, Shaw's Women's Who's Who, 1934, p. 114; Hutchinson's Woman's Who's Who, 1934, p. 112; M Creese (1991), pp. 290-1.
14. Englishwoman's Yearbook, 1907, p. 149 and every year to 1916.
15. Shaw's Women's Who's Who, 1934, p. 29.
16. Directory of Women Teachers, 1914, p. 45; 1927, p. 90.
17. Ibid, 1914, p. 46.
18. Who Was Who, Vol. 3, 1929-40.
19. Directory of Women Teachers, 1914, p. 58.
20. Ibid, 1927, p. 145.
21. Hutchinson's Woman's Who's Who, 1934, p. 195; College calendars 1918-1944, U.C.L. Records Office.

22. Directory of Women Teachers, 1927, p. 156.
23. College calendars, 1908-1910, U.C.L. Records Office; Englishwoman's Yearbook, 1915, p. 83; M Creese (1991), p. 290.
24. Englishwoman's Yearbook, 1907, p. 142.
25. College calendars, 1904-41, U.C.L. Records Office.
26. Englishwoman's Yearbook, 1914, p. 59; Directory of Women Teachers, 1914, p. 90; 1927, p. 182; Hutchinson's Woman's Who's Who, 1934, p. 226.
27. Hutchinson's Woman's Who's Who, 1934, p. 247; Directory of Women Teachers, 1914, p. 98; 1927, p. 202.
28. Englishwoman's Yearbook, 1901, p. 130; M Creese (1991), p. 289.
29. Directory of Women Teachers, 1914, p. 106; 1927, p. 218; Hutchinson's Woman's Who's Who, 1934, p. 262.
30. Directory of Women Teachers, 1914, p. 109; 1927, p. 227.
31. Englishwoman's Yearbook, 1901, p. 132.
32. Directory of Women Teachers, 1914, p. 116.
33. Englishwoman's Yearbook, 1913, p. 58; M Creese (1991), p. 303.
34. Directory of Women Teachers, 1927, p. 272.
35. Ibid, 1914, p. 138; M Creese (1991), p. 303.
36. Hutchinson's Woman's Who's Who, 1934, p. 343; Shaw's Women's Who's Who, 1934, p. 281.
37. Directory of Women Teachers, 1927, p. 296.
38. Ibid, 1914, p. 145.
39. Ibid, 1927, p. 310.
40. Englishwoman's Yearbook, 1913, p. 130.
41. College calendars, 1914-17, U.C.L. Records Office.
42. Englishwoman's Yearbook, 1897, p. 158; 1901, p. 121; 1905, p. 117.
43. Directory of Women Teachers, 1927, p. 341.
44. Ibid, p. 343.
45. Ibid, 1914, p. 167.
46. Ibid, 1927, p. 348; Hutchinson's Woman's Who's Who, 1934, p. 397.
47. M Creese (1991), p. 303; M Creese and T Creese (1994), pp. 35-6.

48. Directory of Women Teachers, 1914, p. 171; Hutchinson's Woman's Who's Who, 1934, p. 403.
49. Directory of Women Teachers, 1914, p. 172.
50. Ibid, p. 172.
51. Englishwoman's Yearbook, 1906, p. 138; College calendars 1903-1908, U.C.L. Records Office.
52. Directory of Women Teachers, 1927, p.395.
53. Shaw's Women's Who's Who, 1934, p. 348.
54. Directory of Women Teachers, 1914, p. 191; College calendars, 1911-24, U.C.L. Records Office.
55. Englishwoman's Yearbook, 1914, p. 60; College calendars, 1913-25, U.C.L. Records Office.
56. Directory of Women Teachers, 1927, p. 413.
57. Ibid, 1914, p. 201;
58. Who's Who in British Science, 1953, p. 252; Shaw's Women's Who's Who, 1933, p. 33; 1934, p. 362; Who Was Who, Vol. 5, 1951-60.
59. Directory of Women Teachers, 1914, p. 201.
60. Englishwoman's Yearbook, 1905, p. 134.
61. Directory of Women Teachers, 1927, p. 425.
62. Englishwoman's Yearbook, 1899, p. 111; 1900, p. 122, and every year to 1905.
63. Hutchinson's Woman's Who's Who, 1934, p. 474; Shaw's Women's Who's Who, 1934, p. 368.
64. Englishwoman's Yearbook, 1901, p.130; 1907, p. 149; 1911, p. 54 and every year to 1916; Hutchinson's Woman's Who's Who, 1934, p. 477; College calendars, 1905-1908, U.C.L. Records Office.
65. Who Was Who, Vol. 4, 1941-50; Hutchinson's Woman's Who's Who, 1934, p. 477; Shaw's Women's Who's Who, 1934, p. 430.
66. Englishwoman's Yearbook, 1914, p. 60; Directory of Women Teachers, 1927, p. 439; Who's Who in British Science, 1953, p. 263.
67. Directory of Women Teachers, 1914, p. 215.
68. Hutchinson's Woman's Who's Who, 1934, p. 513.

## Glossary of Terms

A.A.M.	Association of Assistant Mistresses.
A.E.B.	Association of Economic Biologists
A.U.W.T.	Association of University Women Teachers
A.W.S.T.	Association of Women Science Teachers
B.F.U.W.	British Federation of University Women
B.I.P.	British Institute of Physiology
B.P.A.	British Psychological Association
BS	Bachelor of Surgery
BSc	Bachelor of Science
C.B.E.	Commander of the British Empire
D.B.E.	Dame of the British Empire
DSc	Doctor of Science
Ent. Soc.	Entomological Society
E.S.	Ecological Society
F.G.S.	Fellow of the Geological Society
F.L.S.	Fellow of the Linnaean Society
F.R.E.S.	Fellow of the Royal Entomological Society of London
F.R.S.L.	Fellow of the Royal Society of Literature
F.Z.S.	Fellow of the Zoological Society
I.F.U.W.	International Federation of University Women
L.A.	London Association
L.S.E.	London School of Economics and Political Science
MB	Bachelor of Medicine
M.B.E.	Member of the British Empire
MD	Doctor of Medicine
M.D.U.P.I.	Medical Defence Union for Prevention of Insanity
M.R.C.S./	Member of the Royal College of Surgeons,
L.R.C.P.	Licenciate of the Royal College of Physicians
MSc	Master of Science
M.W.F.	Medical Women's Federation
N.S.L.R.	National Society for Lunacy Reform
O.B.E.	Officer of the British Empire
O.M.	Order of Merit
PhD	Doctor of Philosophy
R.I.G.B.	Royal Institute of Great Britain
S.A.P.	Society of Applied Biologists
S.P.R.	Society for Physical Research
W.R.V.S.	Women's Royal Voluntary Service

## APPENDIX C

### THE LATER ACTIVITIES OF U.C.L.'s FEMALE SCIENCE GRADUATES FROM 1918

NG = Name not given, in order to preserve confidentiality where the graduate in question does not have records in the public domain.

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
1. ADCOCK, Elsa	1930 Ped 1939 PhD	Lecturer, Mining and Technical College, Wigan.	M I BIOL <sup>1</sup>
2. ADCOCK, Margaret	1928 Ped 1933 MSc Maths	Science mistress, Bournemouth School for girls <sup>2</sup>	
3. NG		Principal, Matlock College of Education, Derbyshire	
4. NG	1932 PhD Psychology		
5. NG		Teacher, Eastbourne	
6. BAINBRIDGE, Henrietta		1920-21: Physiology assistant, U.C.L. <sup>3</sup>	
7. BARDSLEY, Kathleen	1926 MSc Botany	1919-23: Science mistress, Cheltenham Ladies College 1926: Senior Science mistress, Girls County School, Gravesend 1927: Inspector of Schools, Board of Education. <sup>4</sup>	Member: A.A.M., A.U.W.T., A.W.S.T. <sup>4</sup>
8. NG			A.I.C
9. NG	1932 Ped	Senior science mistress, Chislehurst and Sidcup technical School Inspector, Home Office Children's Department	
10. NG		Principal, Catholic Training College, Cavendish Square, London	

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
11. NG	1922 Ped 1926 Studying for MSc, principals and methods of science		
12. NG	1928 Ped		
13. NG	Studying for MSc		
14. NG	1950 MSc Mathematics		
15. NG	1931, MSc Botany	In charge of Library and Accessions Department, Victoria and Albert Museum	
16. NG	1936 PhD Chemistry		
17. NG	1924 PG Dip Psychology		
18. BRADFORD, Enid	Studying for PhD	Research Biochemist, Hanover Foundation Clinic, Glendale, California. Consulting Chemist, Assistant works chemist Numerous publications on food technology. <sup>5</sup>	F.R.I.C. M I BIOL M.S.A.C. <sup>5</sup>
19. NG	1924 Ped		
20. NG	1930 Ped		
21. NG	1923 Ped		
22. NG	1931 Ped		
23. BROWN, Eleanor	1950 PhD	1927: Lecturer in Zoology, Chelsea Polytechnic Reader in Zoology, Chelsea College of Science and Technology. 1967: Reader, University of London	F.Z.S. <sup>6</sup>
24. BROWNING, Phyllis	1926 Ped	1927: Science mistress, High School, Tottenham <sup>7</sup>	
25. NG			1922 L.R.C.P.

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
26. NG	1924 Ped		
27. BUTTERWORTH, Jessie	1924 Ped 1929 PhD	1924: Demonstrator in physics, Bedford College <sup>8</sup>	
28. NG	1930 Ped		
29. NG	1926 Ped		
30. CLARKE, Dorothy	1924 Ped	1921: Science and geography mistress, Parkfields Cedars Secondary School, Derby <sup>9</sup>	Member: A.A.M. <sup>9</sup>
31. COMBER, Margaret	1931 Ped		
32. COOK, Sheila		Assistant mistress, County Secondary School, Sydenham <sup>10</sup>	Member: A.A.M., London Teacher's Association <sup>10</sup>
33. NG		Part-time demonstrator, Chemistry Department, University of Durham.	
34. CRAWLEY, Ailsa	1923 Ped	Senior Lecturer in science, Battersea Training College for Domestic Science 1934: Principal, Bloomsbury Trade School, London <sup>11</sup>	
35. NG	1929 Ped 1933 PhD		
36. CURTIS, Winifred	1939 MSc Botany 1950 PhD 1968 DSc	Lecturer in botany, Tasmania University One publication <sup>12</sup>	
37. DARLEY, Clare	1926 Ped	1925: Science mistress, School of St Mary and St Anne, Abbots Bromley <sup>13</sup>	
38. DIAPER, Brenda	1923 Ped	Assistant mistress, Fairfield High School for girls, Manchester. <sup>14</sup>	
39. DIAPER, Gladys	1924 Ped	Assistgant mistress, Dame Alice Owen's School, Islington <sup>15</sup>	

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
40. DOWLING, Ruby	1935 MSc Botany Studying for PhD	1929-33: Quain research student, U.C.L. 1934-35: Assistant, history and method of science, U.C.L. <sup>16</sup>	
41. NG	1930 Dip. Ed 1935 Studying for MSc	Head of Department of Science, College of Further Education, St. Annes	
42. NG		1946-75: Staff, Spalding High School	
43. NG	1928 MB, BS		
44. EVANS, Gwendolen		Higher Executive Officer Statistics and Intelligence Division, Ministry of Supply. <sup>17</sup>	1961 O.B.E.
45. NG	1929 Ped		
46. FIELD, Margaret	1936 PhD Anthropology 1951 MB, Ch.B	Senior Research Officer, Ghana Academy of Science. 6 publications between 1937 and 1960. <sup>18</sup> Government Anthropologist, Ghana	F.R.A.I. Member of the Royal Medico- Psychological Association. <sup>18</sup>
47. NG	1927 Ped		
48. GILBY, Alice	1929 MB, BS 1933 DPH	Temperance lecturer One publication <sup>19</sup>	1925: Winner, people's league of health travelling scholarship Member: B.M.A., T.C.A., N.B.W.T.A.U., S.L.M.G. <sup>19</sup>
49. NG	1932 MB		
50. NG	1931 Ped		
51. NG	1935 MD		
52. GOUGH, Kathleen		Chief Physicist, Dubilier Condenser Company Ltd, London	1949 Fellow of the Institute of Physics A.M.I.E.E. <sup>20</sup>
53. NG	1930 Ped		



<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
54. NG	1935 DSc		
55. NG	1937 PhD Engineering	1937 Farnborough Establishment Engineer, Ministry of Supply. Principal Scientific Officer, Ministry of Supply Principal Scientific Officer, Ministry of Imperial Aviation	Gold Wakefield Medal of the Royal Aeronautical Society 1969 OBE
56. GURRY, Hilda	1928 MSc Maths	1927: Mathematics assistant, U.C.L. <sup>21</sup> Senior maths mistress, Cambridge High School for Girls	
57. HAIGH, Gwenneth		1919-22: Research assistant, heating and lighting engineering, U.C.L. <sup>22</sup> Principal, Leicester Domestic Science Training College	
58. NG	1927 Ped		
59. NG	1931 MSc Methods and Principles of Science		
60. NG	1929 Ped		
61. NG	1928 Ped		
62. NG	1925 Ped		
63. NG	1929 MSc Engineering		
64. NG	1924 Ped	1924 Science mistress, Gravesend County Secondary School	
65. NG	1928 Ped	Botany mistress, Leeds High School	1971 O.B.E.
66. HATFIELD, Edith	1928 MSc Principals and Methods of Science.	Biology mistress, North London Collegiate School, and publications	Member: A.A.M., A.W.S.T. <sup>23</sup>
67. NG	1932 PhD Chemistry		

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
68. NG	1932 PhD		
69. HENSHAW, Amy	1925 Ped	1925: Science mistress, County School, Sittingborne Headmistress, Lewes County School for Girls Headmistress, Beckenham Grammar School for Girls	Member: A.A.M. <sup>24</sup>
70. HILL, Catherine	1927 PhD Histology and embryology	1923-26: Assistant demonstrator in anatomy, U.C.L. 1927-33: Senior assistant in anatomy, U.C.L. <sup>25</sup>	
71. HILL, Elfrida	1924 MB, BS 1932 DMRE	1920: Demonstrator in physiology, U.C.L. <sup>26</sup> Director, Radiotherapy Department, UCH	Fellow of U.C.L. F.F.R. 1959 C.B.E.
72. NG	1936 PhD Physiology		
73. NG	1928 Studying for MSc	Lecturer in Science and Maths, Notre Dame Roman Catholic Training College, Glasgow Headmistress, Notre Dame High School	
74. NG			1930 M.R.C.S., L.R.C.P.
75. NG	1923 MSc Maths		
76. NG	1928 Ped		
77. HOWARD, Ethel		Matron, Newport Mental Hospital <sup>27</sup>	
78. NG			1926 M.R.C.S., L.R.C.P.
79. NG	1928 MB,BS		1928 M.R.C.S., L.R.C.P. 1930 Fellow of U.C.L. 1934 F.R.C.S. 1939 M.R.C.O.G.
80. NG	1926 MSc Physics 1926 Ped		
81. NG	1926 Ped		

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
82. INCE, Frances	1934 MSc Zoology	1927-28: Research assistant, U.C.L. <sup>28</sup>	
83. INMAN, Esca	1924 Ped	Assistant mistress, Worcester Secondary School for Girls <sup>29</sup>	
84. JENKINS, Elizabeth		Medical practitioner, London	M.R.C.S., L.R.C.P. <sup>30</sup>
85. JONES, Ethel	1930 MSc Maths 1931 MA Education	1928: Mathematics assistant, U.C.L. Senior maths mistress, Hove City School for Girls <sup>31</sup>	
86. JOSLIN, Ivy		1920-22: Assistant demonstrator in physics, Royal Holloway 1922-24: Physics and Chemistry mistress, Howell's School, Denbigh 1924: Physics mistress, High School, Southend on Sea <sup>32</sup>	
87. NG	1927 Ped		
88. NG	1927 Ped		
89. NG	1919 Ped		
90. KING, Rose	1928 Ped MSc London	Assistant lecturer in Chemistry, University College Exeter <sup>33</sup>	
91. NG		Headmistress, Bromley High School	
92. LEISHMAN, Joyce		Headmistress, Kinnaird Park School, Bromley, Kent <sup>34</sup>	
93. LESTER, Hilda	1919 Ped	1919: Assistant mistress, Carlyle School, Chelsea <sup>35</sup>	
94. NG	1928 PhD Chemistry		
95. NG	1931 PhD Engineering		
96. NG		1925-40 Ilford County High School 1940+ Headmistress, Palmer's School for Girls	

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
97. NG		Science mistress, Glanmôr Girls Grammar School, Swansea	
98. LUSH, Joan	1927 MB, BS	1921: Demonstrator in physiology, U.C.L. Assistant Anaesthetist, Southend General Hospital	1925 M.R.C.S., L.R.C.P. <sup>36</sup>
99. NG		Missionary, All Saints School, Naini Tal, India	
100. NG	1929 Studying for PhD (died, 1931)		
101. NG	1929 Studying for PhD (died 1931)		
102. NG	Studying for MSc		
103. NG	1928 Ped		
104. MANSBRIDGE, Dorothy		Assistant mistress, Secondary School, Morley <sup>37</sup>	
105. NG	1928 Ped		
106. NG	1928 MSc Botany		
107. NG	1927 Ped	Teacher, Manchester	
108. MOTTRAM, Winifred	1925 Ped	1925: Assistant mistress, Godolphin and Latymer School, Hammersmith <sup>38</sup>	
109. NG	1929 Ped		
110. NG	1929 Ped		
111. NG	1928 Ped		
112. NAYLOR, Gladys	1928 Studying for MSc	Demonstrator in botany, U.C.L. <sup>39</sup>	
113. NG		Senior science mistress, Rochester	A.R.I.C.

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
114. NG	1929 Ped		
115. NG	1927 MB, BS 1929 D.P.H.		1927 M.R.C.S., L.R.C.P.
116. NG	1934 Diploma in Journalism		
117. NG	1929 Ped		
118. NG	1929 Ped		
119. PALMER, Marion	1928 MSc 1937 DSc	1921 Demonstrator in physiology, U.C.L. <sup>40</sup> Reader in Physiology, U.C.L.	1948 Fellow of U.C.L.
120. PEACH, Constance	1927 MSc Maths	1925-26: Mathematics assistant, U.C.L. <sup>41</sup>	
121. NG	1924 MSc Biochemistry (Died 1931)		
122. PEARSON, Helga	1924 MSc Zoology 1927 DSc Zoology	1920-26: Research assistant in Zoology, U.C.L. 1927-28: Senior Zoology assistant, U.C.L. <sup>42</sup>	
123. NG	1925 MSc Chemistry	Consultant Analyst, Lever Brothers	
124. POTTS, Helen	1924 Ped	Assistant mistress, County School for Girls, Beckenham <sup>43</sup>	Member: A.A.M., A.W.S.T. <sup>43</sup>
125. NG		Supply teacher, Middlesex.	
126. NG	1931 Ped		
127. NG	1929 Ped		
128. NG	1919 Ped		
129. NG	1939 MSc Chemistry	1934: 'Unoccupied'	
130. NG		1926: Junior Assistant, Science Museum Library South Kensington	

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
131. NG		Teacher, Coloma Secondary School, West Croydon, Surrey	
132. NG	1922 PhD		
133. REYNOLDS, Nona	1926 Ped	1926: Assistant mistress, County School, Epsom, Surrey <sup>44</sup>	
134. RICHARDS, Constance	1933, Studying for MSc	Science mistress, Stoke Park Secondary School, Coventry <sup>45</sup> 1951 Teacher at Minchenden Secondary School	
135. NG	1926 Ped		
136. ROSCOE, Margaret	1933, PhD	Researcher with Medical Research Council <sup>46</sup>	
137. NG	1939 PhD		
138. NG	1928 Board of Education Teacher's Certificate	Teacher in Maidstone	
139. NG	1927 Ped		
140. NG	1926 Ped	Teacher	
141. SHEPHERDSON, Elsie		Maths mistress, Newland High School for Girls, Hull <sup>47</sup>	
142. NG		Teacher, Kingston-upon-Thames	
143. NG	1925 Ped		
144. NG	PhD	Senior Lecturer, Biochemistry and Chemistry Department, Guys Hospital Medical School	F.R.I.C.
145. NG	1938 MSc Physiology Studying for PhD 1942 D.C.H.		1941 M.R.C.S., L.R.C.P.
146. NG	1925 Ped		

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
147. SMITH, Winifred		Assistant in natural philosophy, St. Andrews University <sup>48</sup> Senior biochemistry technician, Institute of Lampogology and Oology	
148. SOAR, Janet	1926 Ped	Science mistress, High School, Wisbech <sup>49</sup>	
149. STEEN, Margaret	1931 PhD Zoology	1930: Zoology assistant, U.C.L. <sup>50</sup>	
150. STIMSON, Clara	1928 MA Maths	1921-22 South Hampstead High School 1922: Lecturer in mathematics, Whitelands College, Chelsea <sup>51</sup>	
151. STIMSON, Margaret	1921 MA Maths 1922 Ped 1928 PhD Maths	Headmistress, Sidcot School, Winscombe, Somerset <sup>52</sup>	
152. STOESSIGER, Brenda	1927 MSc Applied Statistics 1933 PhD Statistics	1926-27: Mathematics research assistant, U.C.L. 1930-32: Mathematics and statistics assistant, U.C.L. <sup>53</sup>	
153. NG		Librarian Nueva Granada School, Bogota, South America	
154. SUTTON, Mary		1922: Chemistry mistress, Redland High School, Bristol <sup>54</sup>	
155. TANSLEY, Katherine	1931 PhD Physiology 1937 DSc Physiology	1928-34: Physiology assistant, U.C.L. 1935-38: Demonstrator in physiology, U.C.L. 1940-43: Lecturer in physiology, U.C.L. Worker for Medical Research Council Senior Lecturer, Institute of Ophthalmology 3 publications, 1955-63 Reader in sense organs physiology, Birmingham University <sup>55</sup>	1941 Schafer Prize Member of the Physiological Society Society for Experimental Biology  Fellow of the Royal Society of Medicine. <sup>55</sup>
156. NG		Senior science mistress and Deputy Head, Carnforth High School	
157. NG	1930 Ped	Teacher	
158. NG	1941 PhD Zoology		

<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
159. THOMAS, Mary		General practitioner	M.R.C.S., L.R.C.P. Member: B.M.A., W.M.F. <sup>56</sup>
160. TOOKEY, Phyllis	1924 MSc Chemistry 1927 PhD Biochemistry	1925-27: Physiology assistant, U.C.L. 1927-39: Physiology lecturer, U.C.L. <sup>57</sup>	1933 M.R.C.S., L.R.C.P. 1937 M.R.C.P.
161. NG	1931 Ped		
162. NG	1928 Ped		
163. NG	1922-23 Studying post-graduate course in engineering at Imperial College, London		
164. NG		Director, East Europe Department, British Council	1962 O.B.E.
165. TULLY, Evelyn	1931 MSc Maths	1930: Mathematics assistant, U.C.L. <sup>58</sup>	
166. NG	1925 Ped		
167. NG		Teacher, Goole Grammar School	
168. NG	1926 Ped		
169. NG	1926 Ped		
170. NG	1933 PhD Chemistry		
171. NG	1931 MSc Methods and Principles of Science Studying for PhD		
172. NG	1933 Diploma in Librarianship	Assistant Librarian, UCL	
173. NG		Teacher in Maidstone	
174. WEBER, Hilda	1926 MB, BS 1931 D.P.M. 1932 MD	Physician, Institute of Medical Psychology and publications. <sup>59</sup>	Member: B.M.A., B.P.A., M.R.S.M. <sup>59</sup>



<u>Student Name</u>	<u>Further Qualifications</u>	<u>Occupations</u>	<u>Awards/Fellowships</u>
175. NG		Teacher, Kingston-upon-Thames	
176. NG	1931 Ped		
177. WILCOX, Kathleen	1927 MSc Chemistry <sup>60</sup> 1928 MB, B.Ch		1927 M.R.C.S., L.R.C.P.
178. NG	1929 Ped		
179. NG		Senior Mistress, the Latymer School, Edmonton, London	
180. WINNER, Albertine	1933 MB, BS 1934 PhD MD	1957 Deputy Chief Medical Officer, Ministry of Health	1932 M.R.C.S., L.R.C.P. 1933 University Gold Medal 1935 M.R.C.P. 1946 O.B.E. 1965 Fellow of U.C.L. 1967 D.B.E. <sup>61</sup>
181. NG	1927 Ped	1955 Westcliffe High School for Girls	
182. NG	1928 Ped		
183. NG	1928 Ped		
184. NG	1926 MB, BS 1930 MD		1926 M.R.C.S., L.R.C.P. 1931 M.R.C.P.
185. NG		Teacher, County High School for Girls, Trowbridge	
186. NG	1925 Ped		
187. NG	1931 Ped		

**Source:** Index cards, student records, SR44-306 and college callendars, U.C.L. Records Office; Directory of Women Teachers, 1927; Hutchinson's Woman's Who's Who, 1934; Shaw's Women's Who's Who, 1934; Directory of British Scientists, 1964 and 1966; Who's Who in British Science, 1953; Institute of Physics, List of Members, 1962.

## NOTES TO APPENDIX C

1. Directory of British Scientists, 1964, p. 7; 1966, Vol 1, p. 8.
2. Directory of Women Teachers, 1927, p. 5.
3. College calendars, 1920-21, U.C.L. Records Office.
4. Directory of Women Teachers, 1927, p. 23; Who's Who in British Science, 1953, p. 20; Hutchinson's Woman's Who's Who, 1934, p. 49.
5. Directory of British Scientists, 1966, Vol. 1, p. 185; Shaw's Women's Who's Who, 1934, p. 85.
6. Hutchinson's Woman's Who's Who, 1934, p. 85.
7. Directory of Women Teachers, 1927, p. 60.
8. Ibid, p. 68.
9. Ibid, p. 83.
10. Ibid, p. 92.
11. Ibid, p. 99; Hutchinson's Woman's Who's Who, 1934, p. 136.
12. Who's Who in British Science, 1953, p. 67.
13. Directory of Women Teachers, 1927, p. 107.
14. Ibid, p. 119.
15. Ibid.
16. College calendars, 1929-35, U.C.L. Records Office.
17. British Imperial Calendar and Civil Service List, 1952, p. 721.
18. Directory of British Scientists, 1966, Vol. 1, p. 59.
19. Hutchinson's Woman's Who's Who, 1934, p. 205.
20. Institute of Physics, List of members, 1962, p. 149.
21. College calendars, 1927, U.C.L. Records Office.
22. Ibid, 1919-22.
23. Directory of Women Teachers, 1927, p. 194.
24. Ibid, p. 200.
25. College calendars, 1923-33, U.C.L. Records Office.
26. Ibid, 1920.
27. Shaw's Women's Who's Who, 1934, p. 224.

28. Annual reports, 1931-35, Vol. IX, report for 1934, p. 67, U.C.L. Records Office; college calendars, 1927-28, U.C.L. Records Office.
29. Directory of Women Teachers, 1927, p. 225.
30. Shaw's Women's Who's Who, 1934, p. 233.
31. Directory of British Scientists, 1966, Vol. 1, p. 948; College calendar, 1928, U.C.L. Records Office.
32. Directory of Women Teachers, 1927, p.241.
33. Ibid, p. 248.
34. Shaw's Women's Who's Who, 1934, p. 252.
35. Directory of Women Teachers, 1927, p. 261.
36. Shaw's Women's Who's Who, 1934, p. 262; College calendar, 1921, U.C.L. Records Office.
37. Directory of Women Teachers, 1927, p. 284.
38. Ibid, p. 308.
39. College calendar, 1927, U.C.L. Records Office.
40. Ibid, 1921.
41. Ibid, 1925-26.
42. Annual reports, 1921-25, Vol. VII, report for 1924, p. 32 and annual reports, 1926-30, Vol. VIII, report for 1927; College calendars, 1920-28, U.C.L. Records Office.
43. Directory of Women Teachers, 1927, p. 347.
44. Ibid, p. 362.
45. Ibid, p. 363.
46. Hutchinson's Woman's Who's Who, 1934, p. 418.
47. Directory of Women Teachers, 1927, p. 393.
48. Ibid, p. 405.
49. Ibid, p. 406.
50. College calendar, 1930; Annual reports, 1931-35, Vol. IX, Report for 1931, p. 59, U.C.L. Records Office.
51. Directory of Women Teachers, 1927, p. 417.
52. Shaw's Women's Who's Who, p. 361.
53. College calendars, 1926-32, U.C.L. Records Office.

54. Directory of Women Teachers, 1927, p. 422.
55. Directory of British Scientists, 1966, Vol. 2, p. 625; Who's Who in British Science, 1953, p. 256; College calendars, 1928-43, U.C.L. Records Office.
56. Hutchinson's Woman's Who's Who, 1934, p. 477.
57. College calendars, 1925-39, U.C.L. Records Office.
58. Ibid, 1930.
59. Hutchinson's Woman's Who's Who, p. 507; Shaw's Women's Who's Who, 1934, p. 391.
60. Annual Reports, 1926-30, Vol. VIII, report for 1927, p. 38, U.C.L. Records Office.
61. Hutchinson's Woman's Who's Who, 1934, p. 524; Shaw's Women's Who's Who, 1934, p. 402.

### Glossary of Terms

A.A.M.	Association of Assistant Mistresses
A.I.C.	Agriculture Improvement Council for England and Wales <u>or</u> American Institute of Chemists.
A.M.I.E.E.	Associate Member of the Institute of Electrical Engineers.
A.R.I.C.	Associate of the Royal Institute of Chemistry.
A.U.W.T.	Association of University Women Teachers
A.W.S.T.	Association of Women Science Teachers
B.Ch/Ch.B	Bachelor of Surgery.
B.M.A.	British Medical Association.
B.P.A.	British Psychological Association.
C.B.E.	Commander of the British Empire.
D.B.E.	Dame of the British Empire.
D.C.H.	Diploma in Child Health.
Dip.Ed	Diploma in Education.
D.M.R.E.	Diploma in Medical Radiology and Electrology.
D.P.H.	Diploma in Public Health.
D.P.M.	Doctor of Paediatric Medicine
DSc	Doctor of Science
Fellow Inst. Physics	Fellow of the Institute of Physics.
F.F.R.	Fellow of the Faculty of Radiotherapists.
F.R.A.I.	Fellow of the Royal Anthropological Institute.
F.R.C.S.	Fellow of the Royal College of Surgeons.
F.R.I.C.	Fellow of the Royal Institute of Chemistry.
Fellow Royal Med. Soc.	Fellow of the Royal Medical Society.
F.Z.S	Fellow of the Zoological Society.
MA	Master of Arts.
MB, BS	Bachelor of Medicine, Bachelor of Surgery.
MD	Doctor of Medicine.
Memb. Physiolog. Soc.	Member of the Physiological Society.
Memb. Royal Medico-Psycholog. Assn.	Member of the Royal Medico-Psychological Association.
Memb. Soc. Exp. Biol.	Member of the Society for Experimental Biology.

MI BIOL  
M.R.C.O.G.

M.R.C.P.  
M.R.C.S., L.R.C.P.

M.R.S.M.  
M.S.A.C.  
MSc  
N.B.W.T.A.U.  
O.B.E.

Ped  
PG Dip.

PhD  
S.L.M.G.

T.C.A.  
W.M.F.

Member of the Institute of Biology.

Member of the Royal College of Obstetricians and Gynaecologists.

Member of the Royal College of Physicians.

Member of the Royal College of Surgeons, Licentiate of the Royal College of Physicians.

Member of the Royal Society of Medicine.

Member of the Society for Analytical Chemistry.

Master of Science

National British Women's Total Abstinence Union.

Officer of the British Empire

University Teacher's Diploma (London).

Post Graduate Diploma.

Doctor of Philosophy.

Society of London Medical Graduates

Temperance Collegiate Association

Women's Medical Federation

## BIBLIOGRAPHY

Abbreviations:	B.L.:	British Library
	G.L.R.O.:	Greater London Record Office
	I.E.:	Institute of Education
	P.R.O.:	Public Records Office
	U.C.L.:	University College London
	U.W.:	University of Westminster

### UNPUBLISHED SOURCES

#### Primary Sources

G.L.R.O., Inspection of Regent Street Polytechnic, LCC/ED/HFE/5/236, 1929.

G.L.R.O., Miscellaneous Files, LCC/ED/HFE/5/128, 1925-1950s.

I.E., Teacher's Diploma, Examination Results, 1925-33.

P.R.O., Awards - university examining bodies files, ED72, 1920-30.

P.R.O., Board of Trade Report, LAB 41/4, 1886.

P.R.O., Ministry of Labour: employment and training department. Deputation from the Women's Industrial League, LAB 2/1226/ED, 1920.

P.R.O., Ministry of Labour: training department report, LAB 2/269/T.7073, 1920.

U.C.L. Manuscripts Room, College Correspondence, AM/C/7B, Report by Henry Morley on admission of women to college classes, 1878.

U.C.L. Manuscripts Room, College Correspondence, J Mylne, letters, 1870.

U.C.L. Manuscripts Room, U.C.L. MEM/IB/18, M Adamson, 'University College and Women Science Students, 1884-1885', 1926.

U.C.L. Manuscripts Room, Professor's Fees Books, 1878-1881.

U.C.L. Manuscripts Room, 'Statement of Present Requirements and Proposals for the Building', 1878.

U.C.L. Records Office, College Fees Books, 1885-1891.

U.C.L. Records Office, Committee of Management Minute Book, 1873-1880.

U.C.L. Records Office, Faculty of Arts and Laws Minute Book, 1900.

U.C.L. Records Office, Faculty of Engineering Minute Book, 1914, 1919-27 and 1927-38.

U.C.L. Records Office, Faculty of Laws Minute Book, 1908-29.

U.C.L. Records Office, Faculty of Medical Sciences Minute Book, 1906-1921.

U.C.L. Records Office, Minutes of College Committee, 1907, 1918-19, 1919-20, 1925-26.

U.C.L. Records Office, Professor's Fees Books, 1882-1913.

U.C.L. Records Office, University of London Calendar, 1905-1906.

U.C.L. Records Office, Student Record Files, SR1-SR306, 1883-1950s.

U.W. Archives, Candidate Books, p. 106a and p. 107a, 1904-1930.

U.W. Archives, City and Guilds Examination Results, p. 119a-f, 1895-1904.

U.W. Archives, Course Registers : higher commerce, 1920-24; photography, 1918-30; Balderton Street Classes, 1918-30; science courses, 1918-24; languages, 1920-28; chemistry, 1920-28.

U.W. Archives, Department of Science and Art Examination Results, p. 116a-h and p. 117a-g, 1897-1911.

## **Secondary Sources**

Bartlett, M (1995), 'Education for Industry: attitudes and policies affecting the provision of technical education in Britain, 1916-1929' (Unpublished Oxford DPhil thesis).

Blakestad, N (1992), 'In the Real Interest of Women : the household science movement in the history of women's higher education in England', (Paper presented to the History of Education Society Conference, Liverpool, 4-6 December).

Cox, J (1990), 'Independent Englishwomen in Delhi and Lahore, 1860-1947', (Paper presented to the Annual Meeting of the American Historical Society, December).

Kelly, S (1984), 'A Sisterhood of Service, the first twenty five years of the National Union of Women Workers', (Unpublished MA Thesis).

Law, C (1993), 'The women's movement during the 1920s', (Paper presented at the Institute of Historical Research, London, 26 October).

Orr, K (1994), (Unpublished paper presented at the Economic History Society Conference, Nottingham, 8 April).

Serrano-Widdowson, M Del Carmen (1991), 'Pioneers of Women's Education at University College London. The Seminal Decade, 1870-1880', (Unpublished MA Thesis).

## **PUBLISHED SOURCES**

### **Primary Sources**

B.L., Hansard, 3rd series, Volumes 249, 1879, and 339 and 340, 1889.

B.L., Hansard, 4th series, Volumes 105, 107, 109 and 115, 1902.

B.L., Hansard, 5th series, Volume 19, 1910.

B.L., Hansard, Volume 120, 1919.



B.L., Public General Acts, 42 and 43 Victoria, Volume 46, Chapter 65.

B.L., Public General Acts, 52 and 53 Victoria, Volume 56, Chapter 76.

B.L., Public General Acts, 55 and 56 Victoria, Volume 60, Chapter 29.

B.L., Public General Acts, 2 Edward VII, Volume 70, Chapter 42.

B.L., Public General Acts, 10 Edward VII, and 1 George V, Volume 78, Chapter 37.

B.L., Public General Acts, 9 and 10 George V, Chapter 71.

B.L., SPR.MIC.E.291, Parliamentary Papers, XX, p. 259, 1900, Board of Education, returns from university colleges.

B.L., SPR.MIC.E.291, Parliamentary Papers, LIX, p. 17, 1911, Statement of Grants Available from the Board of Education in aid of technological and professional work in universities in England and Wales.

B.L., SPR.MIC.E.291, Parliamentary Papers, XXVI, p. 605, 1921, University Grants Committee, returns from universities and university colleges in receipt of treasury grants, 1919-20.

B.L., UGC, Report for the Period 1929-30 to 1934-35 (1936, HMSO, London).

G.L.R.O., L.C.C. Education Committee, Minutes of Proceedings, 1904-15.

G.L.R.O., L.C.C. Education Committee Minutes, 1916-30.

P.R.O., UGC, 3/1, 3/6 and 3/11, Returns from universities and university colleges in receipt of treasury grants, 1919-20, 1924-25, 1929-30.

U.C.L. Records Office, Annual Reports, 1918-35.

U.C.L. Records Office, College Calendars, 1878-1930.

U.C.L. Records Office, U.C.L. Union Magazine, 1911-20.

U.C.L. Records Office, University College Magazine, 1920-30.

U.W. Archives, Home Tidings, 1876-1888.

U.W. Archives, Polytechnic Magazine, 1888-1930.

U.W. Archives, Polytechnic Prospectuses, 1888-89, 1901-2 to 1907-8, 1908-14, 1918-30.

U.W. Archives, Royal Polytechnic Programmes, R48-R56, 1873, 1878.

### **Contemporary Journals**

The Englishwoman's Review : of Social and Industrial Questions, 1880-1910, (Englishwoman's Review, London).

The Englishwoman's Yearbook, 1882-1916, (Labour News Publishing, London).

The Girl's Realm, 1898-1914, (Cassell, London).

Journal of the Women's Education Union, 1873-1882, (National Union for Improving the Education of Women of all Classes).

The Year Book of Women's Work and Guide to Remunerative Employment, 1875, (Labour News Publishing, London).

### **Secondary Sources**

#### **i) Guides, Directories and Reference Material**

Barrow, M (1981), Women, 1870-1928 : a select guide to printed and archival sources in the U.K., (Mansell, New York).

British Imperial Calendar and Civil Service List (1952), (H.M.S.O., London).

Crawford, A (et al) (eds) (1983), The Europa Biographical Dictionary of British Women, (Europa, London).

Department of Scientific and Industrial Research (1964), Directory of British Scientists, (Ernest Benn, London).

Department of Scientific and Industrial Research (1966), Directory of British Scientists, (Ernest Benn, London).

Dictionary of National Biography (1886) (Smith, Elder and Co, London).

Dictionary of National Biography (1937) (Oxford University Press).

Directory of Women Teachers and other women engaged in higher and secondary education (1914), (The Year Book Press, London).

Directory of Women Teachers : a directory of women engaged in the work of higher and secondary education (1927), (The Year Book Press, London).

Hutchinson's Woman's Who's Who (1934), (Hutchinson, London).

Institute of Physics (1962), List of Members, (Institute of Physics, London).

London and Cambridge Economic Service (c1971), The British Economy Key Statistics, 1900-1970, (Times Newspapers).

Maclure, J S (1968), Educational Documents, England and Wales, 1816-1968, (Chapman and Hall, London).

Mitchell, B R (1975), European Historical Statistics, 1750-1970, (Macmillan, London and Basingstoke).

Mitchell, B R and Deane, P (1962), Abstract of British Historical Statistics, (Cambridge University Press).

Palmer, A W (1962), Dictionary of Modern History, (Cresset, London).

Paxton, J (1992), The Everyman Dictionary of Abbreviations, (Second edition, Dent and Sons, London).

Sweeney, P E (1993), Biographies of British Women : an annotated bibliography, (Mansell, London).

Third and Fourth Censuses of Production in the U.K. (1931 and 1934), (H.M.S.O., London).

Ugnow, J (ed) (1989), The Macmillan Dictionary of Women's Biography, (Second edition, Macmillan, London and Basingstoke).

Who's Who in British Science (1953), (Leonard Hill, London).

Who Was Who : a cumulative index, 1897-1980 (1981), (Adam and Charles Black, London).

Who Was Who, Volumes 1-8, (Adam and Charles Black, London).

Women's Who's Who (1933), (Shaw, London).

Women's Who's Who (1934), (Shaw, London).

Women's Who's Who (1975), (Women in Management, Croydon).

Women Workers' Directory (1909), (John Bale, Sons and Danielsson, London).

## **ii) Books and Articles**

Abbot, W and Walker, A (1970), The Royal Polytechnic Institution and the Polytechnic, 1838-1970, (P.C.L., London).

Adburgham, A (1989), Shops and Shopping, 1800-1914, (Barrie and Jenkins, London).

Albu, A (1982), 'British Attitudes to Engineering Education: a historical perspective' in K Pavitt (ed), Technical Innovation and British Economic Performance, (Macmillan, London and Basingstoke).

Aldcroft, D H (1983), The British Economy Between the Wars, (Phillip Allen, Oxford).

Aldcroft, D H (1968), 'British Industry and Foreign Competition, 1875-1914' in D H Aldcroft (ed), The Development of British Industry and Foreign Competition, 1875-1914, (George Allen and Unwin, London).

Aldcroft, D H (1964), 'The Entrepreneur and the British Economy 1870-1914', Economic History Review, Volume 17.

Alexander, W (1987), First Ladies of Medicine : the origins, education and destination of early women medical graduates of Glasgow University, (Wellcome Unit for the History of Medicine, University of Glasgow).

Alford, B W E (1975), Depression and Recovery? British economic growth, 1918-1939, (Macmillan, London and Basingstoke).

Alford, B W E (1973), W D and H O Wills and the Development of the UK Tobacco Industry, 1786-1965, (Methuen, London).

Alic, M (1986), Hypatia's Heritage : a history of women in science from antiquity to the late nineteenth century, (The Women's Press, London).

Alter, P (1988), 'Science and the Anglo-German Antagonism' in T Gourvish and A O'Day (eds), Later Victorian Britain, 1867-1900, (Macmillan, London and Basingstoke).

Anderson, G (1988), The White Blouse Revolution : female office workers since 1870, (Manchester University Press).

Anderson, Dame K (1963), Women and the Universities : a changing pattern, (Bedford College, London).

Anderson, M (1993), 'The Social Implications of Demographic Change' in F M L Thompson (ed), Cambridge Social History of Britain, 1750-1900, Volume 2, (Cambridge University Press).

Anderson, M (1984), 'The Social Position of Spinsters in Mid-Victorian Britain', Journal of Family History, Volume 9, Number 4.

Anderson, R D (1992), Universities and Elites in Britain Since 1800, (Macmillan, London and Basingstoke).

Antler, J (1980), '"After College What?" : new graduates and the family claim,' American Quarterly, Volume 32, Number 4.

Argles, M (1964), South Kensington to Robbins: an account of English technical and scientific education since 1851, (Longmans, London).

Armytage, W H G (1976), A Social History of Engineering, (Fourth edition, Faber and Faber, London).

Bainbridge, C (1984), One Hundred Years of Journalism : Social aspects of the press, (Macmillan, London and Basingstoke).

Baines, D E (1981), 'The Labour Supply and the Labour Market, 1860-1914' in R Floud and D N McCloskey (eds), The Economic History of Britain since 1700, Volume 2, 1860-1970s, (Cambridge University Press).

Baines, D E (1994), 'The Onset of Depression' in P Johnson (ed), Twentieth Century Britain, Economic, Social and Cultural Change, (Longman, London).

Banks, J A (1954), Prosperity and Parenthood, (Routledge and Kegan Paul, London).

Banks, O (1981), Faces of Feminism : a study of feminism as a social movement, (Martin Robertson, Oxford).

Barnett, C (1986), The Audit of War, (Macmillan, London and Basingstoke).

- Bateson, M (1895), Professional Women upon their Professions : conversations, (Horace Cox, London).
- Bellot, H H (1929), University College London, 1826-1926, (University of London Press).
- Bemrose, G (1955), Nineteenth Century Pottery and Porcelain, (Faber and Faber, London).
- Berg, M (1985), The Age of Manufactures, 1700-1820, (Fontana, London).
- Berg, M (1992), 'The First Women Economic Historians', Economic History Review, Volume 45, Number 2.
- Bird, E (1991), 'To Cook or to Conjugate : gender and class in the adult curriculum, 1865-1900 in Bristol, United Kingdom', Gender and Education, Volume 3, Number 2.
- Black, C (1915), Married Women's Work, (Virago Press, London).
- Bourke, J (1994), Working-Class Cultures in Britain, 1890-1960, (Routledge, London).
- Bradley, H (1992), Men's Work, Women's Work: a sociological history of the sexual division of labour in employment, (Polity Press, Cambridge).
- Braybon, G (1981), Women Workers in the First World War, (Croom Helm, London).
- Bremner, C S (1897), Education of Girls and Women in Great Britain, (Swan Sonnenschein, London).
- Brittain, V (1980), Testament of Experience, (First published 1957, Fontana, London).
- Brittain, V (1978), Testament of Youth, (Virgo, London).
- Broadbent, B (1990), 'A History of Women on the Bench', The Magistrate, Volume 46, Number 7.

Bryant, M E (1979), The Unexpected Revolution : a study in the history of the education of women and girls in the nineteenth century, (Institute of Education, London).

Burgess, K (1988), 'Did the Late Victorian Economy Fail?' in T R Gourvish and A O'Day (eds), Later Victorian Britain, 1867-1900, (Macmillan, London and Basingstoke).

Burgess, K (1993), 'Education Policy in Relation to Employment in Britain, 1935-45 : a decade of missed opportunities', History of Education, Volume 22, Number 4.

Burstyn, J N (1980), Victorian Education and the Ideal of Womanhood, (Croom Helm, London).

Bush, J (1994), '"The Right Sort of Woman" : female emigrators and emigration to the British Empire, 1890-1910', Women's History Review, Volume 3, Number 3.

Butcher, P S (1989), Education for Equality : women's rights periodicals and women's higher education, 1849-1920, (Greenwood Press, London).

Buxton, N K (1975), 'The Role of the New Industries in Britain During the 1930s', Business History Review, Volume 49.

Cadbury, E , Matheson, M C and Shann, G (1909), Women's Work and Wages: a phase of life in an industrial city, (T Fisher Unwin, London).

Caine, B (1992), Victorian Feminists, (Oxford University Press).

Cantwell, J (1991), 'Historical Trends in International Patterns of Technological Development' in Foreman-Peck, J (ed), New Perspectives on the Late Victorian Economy, (Cambridge University Press).

Carnaffon, G (1988), 'Commercial Education and the Female Office Worker' in G Anderson (ed), The White Blouse Revolution : female office workers since 1870, (Manchester University Press).



Cassis, Y (1990), 'British Finance, Success and Controversy' in J J Van Helten, and Y Cassis (eds), Capitalism in a Mature Economy: financial institutions, capital exports and British industry, 1870-1939, (Edward Elgar, Aldershot).

Catterall, R E (1979), 'Electrical Engineering' in N K Buxton and D H Aldcroft (eds), British Industry Between the Wars, (Scolar Press, London)

Cecil, H (1958), 'Women at the Bar', Solicitor's Journal, Volume 102.

Central Bureau for the Employment of Women, (Undated, BL catalogue suggests 1910), The Fingerpost : a guide to the professions and occupations of educated women, (Central Bureau for the Employment of Women).

Chapman, S (1974), Jesse Boot of Boots the Chemist: a study in business history, (Hodder and Stoughton, London).

Church, R A (1975), The Great Victorian Boom, 1850-1873, (Macmillan, London and Basingstoke).

Clinton, A (1984), Post office workers: a trade union and social history, (George Allen and Unwin, London).

Coleman, D C (1969), Courtaulds, an economic and social history, II, Rayon, (Oxford University Press).

Coleman, D C (1973), 'Gentlemen and Players' Economic History Review, Volume 26.

Coleman, D C and MacLeod, C (1986), 'Attitudes to New Techniques: British businessmen 1800-1950' Economic History Review, Volume 39.

Collet, C (1890), The Economic Position of Educated Women : a discourse, (E W Allen, London).

Collet, C (1902), Educated Working Women : essays on the economic position of women workers in the middle classes, (P S King, London).

Copelman, D (1986), 'A New Comradeship Between Men and Women : family, marriage and London's women teachers, 1870-1914' in J Lewis (ed), Labour and Love, women's experience of home and family, 1850-1940, (Basil Blackwell, Oxford).

Cott, N (1987), The Grounding of Modern Feminism, (Yale University Press).

Cottrell, P L (1975), British Overseas Investment in the Nineteenth Century, (Macmillan, London and Basingstoke).

Crafts, N F R (1985), British Economic Growth during the Industrial Revolution, (Oxford University Press).

Crafts, N F R (1979), 'Victorian Britain did Fail' Economic History Review, Volume 32.

Creese, M (1991), 'British Women of the Nineteenth and early Twentieth Centuries who Contributed to Research in the Chemical Sciences', British Journal for the History of Science, Volume 24.

Creese, M and Creese, T (1994), 'British Women who Contributed to Research in the Geological Sciences in the Nineteenth Century', British Journal for the History of Science, Volume 27.

Crouzet, F (1982), The Victorian Economy, (Columbia University Press).

Daunton, M J (1985), Royal Mail: the Post Office since 1840, (Athlone Press, London).

Davies, C (1988), 'The Health Visitor as Mother's Friend: a woman's place in public health, 1900-1914', Social History of Medicine, Volume 1, Number 1.

Davies, E (1866), The Higher Education of Women, (Alexander Strahan, London).

Davies, E (1910), Questions Relating to Women, (Bowes and Bowes, Cambridge).

Davis, L and Huttenbach, R A (1985), 'The Export of British Finance, 1865-1914', Journal of Imperial and Commonwealth History, Volume 13.

Deane, P and Cole, W A (1969), British Economic Growth, 1688-1959, (Cambridge University Press).

Delamont, S (1978), 'The Contradictions in Ladies Education' in S Delamont and L Duffin (eds), The Nineteenth Century Woman : her cultural and physical world, (Croom Helm, London)

Devereaux, W (1982), Adult Education in Inner London, 1870-1980, (Shepherd-Walwyn, London).

Dex, S (1985), The Sexual Division of Work, (Wheatsheaf, Brighton).

Donnelly, J F (1991), 'Science, Technology and Industrial Work in Britain, 1860-1930: towards a new synthesis' Social History, Volume 16, Number 2.

Drake, B (1918), Women in the Engineering Trades: a problem, a solution and some criticisms, (George Allen and Unwin, London).

Dyhouse, C (1978), 'The Condition of England, 1860-1900' in L Lerner (ed), The Victorians, (Methuen, London).

Dyhouse, C (1989), Feminism and the Family in England, 1880-1939, (Basil Blackwell, Oxford).

Dyhouse, C (1981), Girls Growing Up in Late Victorian and Edwardian England, (Routledge and Kegan Paul, London).

Dyhouse, C (1977), 'Good Wives and Little Mothers : social anxieties and the schoolgirl's curriculum, 1890-1920', Oxford Review of Education, Volume 3, Number 1.

Dyhouse, C (1987), 'Miss Buss and Miss Beale : gender and authority in the history of education' in F Hunt (ed), Lessons for Life : the schooling of girls and women, 1850-1950 (Basil Blackwell, Oxford).

- Dyhouse, C (1995), No Distinction of Sex? Women in British Universities, 1870-1939, (U.C.L. Press, London).
- Dyhouse, C (1978a), 'The Role of Women : from self-sacrifice to self awareness' in L Lerner (ed), The Victorians, (Methuen, London).
- Dyhouse, C (1976), 'Social Darwinistic Ideas and the Development of Women's Education in England, 1880-1920' History of Education, Volume 5, Number 1.
- Dyhouse, C (1984), 'Storming the Citadel or Storm in a Teacup? The entry of women into higher education, 1860-1920' in S Acker and D Warren-Piper (eds), Is Higher Education Fair to Women? (Nelson, Guildford).
- Dyhouse, C (1978b), 'Towards a Feminine Curriculum for English Schoolgirls : the demands of ideology, 1870-1963', Women's Studies International Quarterly, Volume 1, Number 4.
- Dyhouse, C (1981a), 'Working Class Mothers and Infant Mortality in England, 1895-1914' in C Webster (ed), Biology, Medicine and Society, 1840-1940, (Cambridge University Press).
- Edelstein, M (1985), 'Foreign Investment and Empire, 1860-1914' in R Floud and D N McCloskey (eds), The Economic History of Britain Since 1700, Volume 2, 1860-1970s, (Cambridge University Press).
- Edgerton, D E H (1991), 'The Prophet Militant and Industrial: the peculiarities of Correlli Barnett'. Twentieth Century British History, Volume 2, Number 3.
- Edgerton, D E H (1987), 'Science and Technology in British Business History' Business History, Volume 29, Number 4.
- Edwards, E (1993), 'The Culture of Femininity in Women's Teacher Training Colleges, 1900-50', History of Education, Volume 22, Number 3.
- Elbaum, B (1989), 'Why Apprenticeship Persisted in Britain, but not in the United States' Journal of Economic History, Volume 49, Number 2.

- Elbaum, B and Lazonick, W (1984), 'The Decline of the British Economy: an institutional perspective', Journal of Economic History, Volume 44.
- Elliott, P (1978), 'Professional Ideology and Organisational Change : the journalist since 1800' in G Boyce, J Curran and P Wingate (eds), Newspaper History from the Seventeenth Century to the Present Day, (Constable, London).
- Ellis, G S M (1925), The Poor Student and the University, (Labour Publishing, London).
- Emmerson, G S (1973), Engineering Education : a social history, (David and Charles, Newton Abbot).
- Eschbach, E S (1993), The Higher Education of Women in England and America, 1865-1920, (Garland, New York and London).
- Evans, D E (1953), The University of Wales : a historical sketch, (University of Wales Press).
- Evans, E W and Wiseman, N C (1984), 'Education, Training and Economic Performance: British economists' views 1868-1939 Journal of European Economic History, Volume 13, Number 1.
- Evans, W G (1990), Education and Female Emancipation: the Welsh experience, 1847-1914, (University of Wales Press, Cardiff).
- Fearon, P (1979), The Origins and Nature of the Great Slump, 1929-1932, (Macmillan, London and Basingstoke).
- Feinstein, C (1990), 'New Estimates of Average Earnings in the United Kingdom, 1880-1913' Economic History Review, Volume 43, Number 4.
- Ferguson, N A (1975), 'Women's Work : employment opportunities and economic roles, 1918-39', Albion, Volume 7, Number 1.
- Fitch, J G (1890), 'Women and the Universities', Contemporary Review, Volume 58.

- Forbes, G (1994), 'Medical Careers and Health Care for Indian Women : patterns of control', Women's History Review, Volume 3, Number 4.
- Fowler, A and Wyke, T (1989), From Evening School to Polytechnic : one hundred years of commercial education in Manchester, (Manchester Polytechnic).
- Fox, R and Guagnini, A (1985), 'Britain in Perspective : the European context of industrial training and innovation, 1880-1914', History and Technology, Volume 2, Number 2.
- Garrison, D (1975), 'The Feminization of Public Libraries, 1876-1906', Library History Review, Volume 2, Number 4.
- Gibert, J (1994), 'Women Students and Student Life at England's Civic Universities Before the First World War', History of Education, Volume 23, Number 4.
- Glucksman, M (1990), Women Assemble : women workers and the new industries in inter-war Britain, (Routledge, London).
- Gordon, A M (1895), 'The After-Careers of University Educated Women', The Nineteenth Century, Volume 37.
- Gordon, L D (1990), Gender and Higher Education in the Progressive Era, (Yale University Press, New Haven and London).
- Gordon, P, Aldrich, R and Dean, D (1991), Education and Policy in England in the Twentieth Century, (The Woburn Press, London).
- Gospel, H F (1991), Industrial Training and Technical Innovation, (Routledge, London).
- Gurney, M (ed) (1872), Are we to have Education for our Middle Class Girls?, (William Ridgeway, London).
- Haber, L (1979), Women Pioneers of Science, (Harcourt Brace Jovanovich, New York and London).

Hakim, C (1979), 'Occupational Segregation', Research Paper Number 9, (Department of Employment, London).

Hall, L A (1994), 'Chloe, Olivia, Isabel, Letitia, Hariette, Honor and Many More : women in medicine and biomedical science, 1914-45' in S Oldfield (ed), This Working-Day World: women's lives and cultures in Britain, 1914-1945, (Taylor and Francis, London).

Hall, P G (1962), The Industries of London since 1861, (Hutchinson, London).

Halsey, A H (1972), 'Higher Education' in A H Halsey (ed), Trends in British Society Since 1900, (Macmillan, London and Basingstoke).

Halsey, A H (1988), 'Higher Education' in A H Halsey (ed), British Social Trends Since 1900, (Macmillan, London and Basingstoke, 2nd edition).

Hamilton, S (1983), 'The First Generations of University Women, 1869-1930' in G Donaldson (ed), Four Centuries, Edinburgh University Life, 1583-1983, (Edinburgh University Press).

Hamilton, S (1982), 'Interviewing the Middle-classes : women graduates of the Scottish universities, c. 1910-1935', Oral History, Volume 10, Number 2.

Hammerton, A J (1979), Emigrant Gentlewomen : genteel poverty and female emigration, 1830-1914, (Croom Helm, London).

Hannah, L (1983), The Rise of the Corporate Economy, (Second edition, Methuen, London)

Harrop, J (1979), 'Rayon' in N K Buxton and D H Aldcroft (eds), British Industry Between the Wars, (Scolar press, London).

Harte, N B (1979), The Admission of Women to University College London: a centenary lecture, (U.C.L., London).

Harte, N B (1986), The University of London, 1836-1986, (Athlone Press, London).

Harte, N B and North, J (1978), The World of University College London, 1828-1978, (U.C.L., London).

Harvey, A D (1991), 'Jaw, Jaw about the War, War', Times Higher, 4 October.

Hancock, E P (1990), 'Technological Innovation in England, 1850-1926: the uses of a German model', History of Education, Volume 19, Number 4.

Higgs, E (1989), Making Sense of the Census: the manuscript returns for England and Wales, 1801-1901, (HMSO Publications, London).

Hobsbawm, E J (1968), Industry and Empire, (Weidenfeld and Nicolson, London).

Hoffman, R J S (1933), Great Britain and the German Trade Rivalry, 1875-1914, (University of Pennsylvania Press, Philadelphia)

Hollis, P (1987), Ladies Elect : women in English local government, 1865-1914, (Clarendon, Oxford).

Holloway, S W F (1991), Royal Pharmaceutical Society of Great Britain, 1841-1991 : a political and social history, (The Pharmaceutical Press, London).

Holton, S (1986), Feminism and Democracy : women's suffrage and reform politics in Britain, 1900-1918, (Cambridge University Press).

Horn, P (1988), 'The Education and Employment of Working Class Girls, 1870-1914', History of Education, Volume 17, Number 1.

Howarth, J (1987), 'Science Education in Late Victorian Oxford : a curious case of failure?', English Historical Review, Volume C11, Number 403.

Howarth, J and Curthoys, M (1987), 'The Political Economy of Women's Higher Education in Late Nineteenth Century and Early Twentieth Century Britain' Historical Research, Volume 60, Number 142.

Howarth, J and Curthoys, M (1987a), 'Gender, Curriculum and Career : a case study of women university students in England before 1914' in P Summerfield (ed), Women,



● Education and the Professions, (History of Education Society Occasional Publications, Number 8).

Hubback, J (1957), Wives Who Went to College, (William Heinemann, London).

Hunt, E H (1981), British Labour History, 1815-1914, (Weidenfeld and Nicolson, London).

● Hunt, F (1986), 'Opportunities lost and gained: mechanisation and women's work in the London bookbinding and printing trades' in A, John (ed), Unequal Opportunities: women's employment in England 1800-1918, (Blackwell Oxford).

Hutchins, B L (1913), 'Higher Education and Marriage', The Englishwoman, Volume 18, Number 54.

● Innis, H A (1949), The Press : a neglected factor in the economic history of the twentieth century, (Oxford University Press).

Jeffreys, S (1985), The Spinster and her Enemies, feminism and sexuality 1880-1930, (Pandora Press, London).

Jepson, N A (1973), The Beginnings of English University Adult Education : policy and problems, (Michael Joseph, London).

● Jones, D R (1988), The Origins of Civic Universities, Manchester, Leeds and Liverpool, (Routledge, London).

Jones, J and Castle, J (1986), 'Women in UK Universities, 1920-1980', Studies in Higher Education, Volume 11, Number 3.

● Kelly, T (1970), A History of Adult Education in Great Britain, (Liverpool University Press).

Kendall, C (1991), 'Higher Education and the Emergence of the Professional Woman in Glasgow, c. 1890-1914', History of Universities, Volume 10.

Kennedy, W P (1982), 'Economic Growth and Structural Change in the United Kingdom, 1870-1914', Journal of Economic History, Volume 42.

Kennedy, W P (1974), 'Foreign Investment, Trade and Growth in the United Kingdom, 1870-1913', Explorations in Economic History, Volume 11.

King, S (1990), 'Technical and Vocational Education for Girls : a study of the Central Schools of London, 1918-39' in P Summerfield and E J Evans (eds), Technical Education and the State Since 1850, (Manchester University Press).

Kirby, M W (1981), The Decline of British Economic Power since 1870, (George Allen and Unwin, London).

Land, H (1990), 'Eleanor Rathbone and the Economy of the Family' in H L Smith (ed), British Feminism in the Twentieth Century, (Edward Elgar, Aldershot).

Lane, J (1979), Technical Training of Young Persons c. 1850-1914 in Coventry and the Midlands, (Social Science Research Council).

Lawrence, J (1994), 'The First World War and its Aftermath' in P Johnson (ed), Twentieth Century Britain : economic, social and cultural change, (Longman, London).

Leneman, L (1994), 'Medical Women at War, 1914-1918', Medical History, Volume 38, Number 2.

Levine, A L (1967), Industrial Retardation in Britain, 1880-1914, (Weidenfeld and Nicolson, London).

Lewenhak, S (1977), Women and Trade Unions: an outline history of women in the British trade union movement, (Ernest Benn, London).

Lewenhak, S (1980), Women and Work, (Fontana, London).

Lewis, J (1984), Women in England, 1870-1950, (Wheatsheaf, Brighton).

Lewis, R and Maude, A (1952), Professional People, (Phoenix House, London).

Locke, M (1978), Traditions and Controls in the Making of a Polytechnic, Woolwich Polytechnic, 1890-1970, (Thames Polytechnic, London).

Locke, R R (1989), Management and Higher Education since 1940: the influence of America and Japan on West Germany, Great Britain and France, (Cambridge University Press).

Lundgreen, P (1984), 'Education for the Science Based Industrial State: the case for nineteenth century Germany', History of Education, Volume 13, Number 1.

MacDonough, O (1975), 'Government, Industry and Science in Nineteenth Century Britain', Historical Studies, Volume 16, Number 65.

McWilliams-Tullberg, R (1975), Women at Cambridge : a men's university - though of a mixed type, (Victor Gollancz, London).

Mace, A (1986), The Royal Institute of British Architects: a guide to its archive and history, (Mansell, London)

Mackinnon, A (1990), 'Male Heads on Female Shoulders? New questions for the history of women's higher education', History of Education Review, Volume 19, Number 2.

Macleod, R and Moseley, R (1979), 'Fathers and Daughters: reflections on women, science and Victorian Cambridge', History of Education, Volume 8, Number 4.

Maclure, J S (1970), One Hundred Years of London Education, 1870-1970, (Penguin, London).

Manchester, A H (1980), Modern Legal History, (Butterworth, London).

Manthorpe, C (1986), 'Science or Domestic Science? The struggle to define an appropriate science education for girls in early twentieth century England', History of Education, Volume 15, Number 3.

Martindale, H (1938), Women Servants of the State, 1870-1938 : a history of women in the civil service, (George Allen and Unwin, London).

Marwick, A (1977), Women at War, 1914-1918, (Fontana, London).

Matthews, R C O, Feinstein, C H and Odling-Smee, J C (1982), British Economic Growth, 1856-1973, (Clarendon Press, Oxford).

McCloskey, D N (1981), 'Did Victorian Britain Fail?' in D N McCloskey (ed), Enterprise and Trade in Victorian Britain, (George Allen and Unwin, London).

McFeely, M D (1988), Lady Inspectors: the campaign for a better workplace, 1893-1921, (Blackwell, Oxford).

Melman, B (1988), Women and the Popular Imagination in the 1920s : flappers and nymphs, (Macmillan, London and Basingstoke).

Melville, F H (1915), 'The Preparation of Girls for the University', The Secondary School Journal, June edition.

Merrington, W R (1976), University College Hospital and its Medical School : a history, (William Heinemann, London).

Michie, R C (1992), The City of London: continuity and change, 1850-1990, (Macmillan, London and Basingstoke).

Millerson, G (1964), The Qualifying Associations: a study in professionalisation, (Routledge and Kegan Paul, London).

Moberly Bell, E (1947), Flora Shaw (Lady Lugard, D.B.E.), (Constable, London).

Moore, L (1991), Bajenellas and Semilinas : Aberdeen University and the Education of Women, 1860-1920, (Aberdeen University Press).

Morley, E J (1914), Women Workers in Seven Professions : a survey of their economic conditions and prospects, (Routledge, London).

Morrison-Low, A D (1991), 'Women in the Nineteenth Century Scientific Instrument Trade' in M Benjamin (ed), Science and Sensibility : gender and scientific enquiry, 1780-1945, (Basil Blackwell, Oxford).

Murdock, G and Golding, P (1978), The Structure, Ownership and Control of the Press, 1914-76' in G Boyce (et al), Newspaper History from the Seventeenth Century to the Present Day, (Constable, London).

Murray, M (1963), My First Hundred Years, (William Kimber, London).

Newspaper World (1948), The Press, 1898-1948, (The Newspaper World, London).

Newton, P (1987), 'Who Becomes an Engineer? Social psychological antecedents of a non-traditional career choice' in A Spencer and D Podmore (eds), In A Man's World, (Tavistock, London).

Noble, D F (1979), America by Design, Science, Technology and the Rise of Corporate Capitalism, (Alfred A Knopf, New York).

Oakley, H D (1929), 'Kings College for Women' in F J C Hearnshaw (ed), The Centenary History of Kings College London, 1828-1928, (George G Harrap, London).

Oddy, D (1985), 'Liptons' in D J Jeremy and C Shaw (eds), Dictionary of Business Biography, Volume 3, (Butterworth, London).

Oddy, D (1970), 'Working Class Diets in the late Nineteenth Century', Economic History Review, Volume 23.

Pederson, J S (1979), 'The Reform of Women's Secondary and Higher Education : institutional change and social values in mid and late Victorian England', History of Education Quarterly, Volume 19, Number 1.

- Perrone, F (1993), 'Women Academics in England, 1870-1930', History of Universities, Volume 12.
- Phillips, P (1990), The Scientific Lady : a social history of women's scientific interests, 1520-1918, (Weidenfeld and Nicholson, London).
- Phillips, W H (1982), 'Induced Innovation and Economic Performance in Late Victorian British Industry', Journal of Economic History, Volume 42.
- Pollard, S (1989), Britain's Prime and Britain's Decline, (Edward Arnold, London).
- Pollard, S (1985), 'Capital Exports, 1870-1914: harmful or beneficial?', Economic History Review, Volume 38.
- Pollard, S (1992), The Development of the British Economy, 1914-1990, (Fourth Edition, Edward Arnold, London).
- Pritchard, M (1987), 'Commercial Photographers in Nineteenth Century Great Britain', History of Photography, Volume 11, Number 3.
- Puddefoot, S (1970), 'The Woman Complex' in R Boston (ed), The Press We Deserve, (Routledge, London).
- Pugh, M (1992), Women and the Women's Movement in Britain, 1914-59, (Macmillan, London and Basingstoke).
- Purvis, J (1991), A History of Women's Education in England, (Open University Press, Milton Keynes).
- Purvis, J (1981), '"Women's life is essentially domestic, public life being confined to men" (Compte): Separate spheres and inequality in the education of working-class women, 1854-1900', History of Education, Volume 10, Number 4.
- Ramsden, M J (1973), A History of the Association of Assistant Librarians, 1895-1945, (Association of Assistant Librarians).

Reader, W J (1987), A History of the Institution of Electrical Engineers, 1871-1971, (Peter Peregrinus, London).

Reader, W J (1966), Professional Men : the rise of the professional classes in nineteenth century England, (Weidenfeld and Nicolson, London).

Reader, W J and Slinn, J (1976), Metal Box: a history, (Heinemann, London).

Reid, A (1988), 'World War One and the Working-Class in Britain' in A Marwick (ed), Total War and Social Change, (Macmillan, London and Basingstoke).

Rendel, M (1980), 'How Many Women Academics, 1912-1976?' in R Deem (ed), Schooling for Women's Work, (Routledge, London).

Roberts, E (1988), Women's Work, 1840-1940, (Macmillan, London and Basingstoke).

Robertson, P L (1981), 'Employers and Engineering Education in Britain and the United States, 1890-1914', Business History, Volume 23, Number 1.

Robertson, P L (1974), 'Technical Education in the British Shipbuilding and Marine Engineering Industries, 1863-1914', Economic History Review, Volume 27.

Roderick, G W and Stephens, M D (1982), 'The British Education System, 1870-1970' in G W Roderick and M D Stephens (eds), The British Malaise, (The Falmer Press, Sussex).

Roderick, G W and Stephens, M D (1978), Education and Industry in the Nineteenth Century, (Longman, New York).

Roderick, G W and Stephens, M D (1972), Scientific and Technical Education in Nineteenth Century England, (David and Charles, Newton Abbot).

Rogers, A (1938), Degrees by Degrees : the story of the admission of Oxford women students to membership of the university, (Oxford University Press).

Sandberg, L G (1985), 'The Entrepreneur and Technical Change' in R Floud and D N McCloskey (eds), The Economic History of Britain since 1700, Volume 2, 1860-1970s, (Cambridge University Press).

Sanderson, M (1993), 'Education and the Economy, 1870-1939', REFRESH, Number 17.

Sanderson, M (1988), 'The English Civic Universities and the "Industrial Spirit", 1870-1914', Historical Research, Volume 61.

Sanderson, M (1988a), 'Technical Education and Economic Decline, 1890-1980s', Oxford Review of Economic Policy, Volume 4, Number 1.

Sanderson, M (1972), The Universities and British Industry, 1850-1970, (Routledge and Kegan Paul, London).

Sanderson, M (1975), The Universities in the Nineteenth Century, (Routledge and Kegan Paul, London).

Saul, S B (1972), The Myth of the Great Depression, 1873-1896, (Macmillan, London and Basingstoke).

Saul, S B (1979), 'Research and Development in British Industry from the end of the Nineteenth Century to the 1960s' in T C Smout (ed), The Search for Wealth and Stability: essays in economic and social history, presented to M W Flinn, (Macmillan, London and Basingstoke).

Savage, M (1988), 'Trade Unionism, sex segregation and the state : women's employment in 'new industries' in interwar Britain', Social History, Volume 13, Number 2.

Saville, J (1954), Democracy and the Labour Movement : essays in honour of Dona Torr, (Lawrence and Wishart, London).

Settle, E (1973), My Editor Says, (Sir Isaac Pitman, London).



- Sheavyn, P (1922), Higher Education for Women in Great Britain, (International Federation of Women, pamphlet number 2, London).
- Sheldrake, J and Vickerstaff, S (1987), The History of Industrial Training in Britain, (Avebury, Aldershot).
- Sked, A (1988), Britain's Decline: problems and perspectives, (Basil Blackwell, Oxford).
- Smith, H L (1990), 'British Feminism in the 1920s' in H L Smith (ed), British Feminism in the Twentieth Century, (Edward Elgar, Aldershot).
- Solomon, B M (1985), In the Company of Educated Women, (Yale University Press).
- Spencer, A and Podmore, D (1987), 'Women Lawyers - marginal members of a male-dominated profession' in A Spencer and D Podmore (eds), In a Man's World, (Tavistock, London).
- Stephen, B (1927), Emily Davies and Girton College, (Constable, London).
- Sugarman, D (1993), 'Simple Images and Complex Realities : English lawyers and their relationship to business and politics, 1750-1950', Law and History Review, Volume 11, Number 2.
- Teague, S J (1977), Article in Chelsea College, a history, (Kings College, London).
- Thane, P (1990), 'The Debate on the Declining Birth Rate in Britain : the 'menace' of an ageing population, 1920s-1950s', Continuity and Change, Volume 5, Part 2.
- Thane, P (1992), 'The History of the Gender Division of Labour in Britain: reflections on "'herstory' in accounting, the first eighty years"', Accounting, Organisations and Society, Volume 17, Number 314.
- Thane, P (1981), 'Social History, 1860-1914' in R Floud and D N McCloskey (eds), The Economic History of Britain since 1700, Volume 2, 1860-1970s, (Cambridge University Press).

Thane, P (1991), 'Towards Equal Opportunities? Women in Britain since 1945' in T Gourvish and A O'Day (eds), Britain since 1945, (Macmillan, London and Basingstoke).

Thane, P (1991a), 'Visions of Gender in the Making of the British Welfare State : the case of women in the British Labour Party and social policy, 1906-45' in G Bock and P Thane (eds), Maternity and Gender Policies, women and the rise of the European Welfare States, 1880s-1950s, (Routledge, London).

Thane, P (1993), 'Women in the British Labour Party and the construction of state welfare, 1906-1939' in S Koven and S Mitchel (eds), Mothers of a New World, maternalist policies and the origins of welfare states, (Routledge, London).

Thom, D (1988), 'Women and Work in Wartime Britain' in R Wall and J Winter (eds), The Upheaval of War : family, work and welfare in Europe, 1914-18, (Cambridge University Press).

Thomas, J B (1978), 'The Day Training College : a Victorian innovation in teacher training', British Journal of Teacher Education, Volume 4, Number 3.

Thompson, C (1991), Women's Engineering Society 1919 to the Present Day, (Women's Engineering Society, London).

Thompson, F M L (1990), The University of London and the World of Learning, 1836-1986, (Hambledon, London).

Tuke, M J (1928), 'Women Students in the Universities', Contemporary Review, Volume 133.

Tylecote, M (1941), The Education of Women at Manchester University, 1883-1933, (Manchester University Press).

Usher, H J K, Black-Hawkins, C D and Carrick, G J (eds) (1981), An Angel Without Wings : a history of University College School 1830-1980, (University College School, London).

- Van Thal, H (1979), Eliza Lynn Linton : the girl of the period, (George Allen and Unwin, London).
- Vernon, B (1982), Ellen Wilkinson, 1891-1947, (Croom Helm, London).
- Vicinus, M (1985), Independent Women : work and community for single women, 1850-1920, (Virago, London).
- Vicinus, M (1982), 'One Life to Stand Beside Me : emotional conflicts in first-generation college women in England', Feminist Studies, Volume 8.
- Walker, W B (1982) 'Britain's Industrial Performance, 1850-1950: a failure to adjust' in Pavitt, K (ed), Technical Innovation and British Economic Performance, (Macmillan, London and Basingstoke).
- Ward, S (1975), 'Great Britain : land fit for heroes lost' in S Ward (ed), The War Generation, (Kennikat Press, New York and London).
- Watson, G (1988), The Civils : the story of the institution of civil engineers, (Telford, London).
- Webber, N (1984), 'Prospect and Prejudice : women and librarianship, 1880-1914', Library History, Volume 6, Number 5.
- Weibel, K, Heim, K and Ellsworth, D (1979), The Role of Women in Librarianship, 1876-1976, the entry, advancement and struggle for equalization in one profession, (Oryx Press, London).
- West, E G (1970), Education and the State, (Institute of Economic Affairs, London).
- Whitaker, W B (1973), Victorian and Edwardian Shopworkers, (David and Charles, Newton Abbot).
- Wiener, M J (1981), English Culture and the Decline of the Industrial Spirit, 1850-1980, (Cambridge University Press).

Wigfall, V (1980), 'Architecture' in R Silverstone and A Ward (eds), Careers of Professional Women, (Croom Helm, London).

Wigham, E and Branson, N (1976), Strikes and the Government, 1893-1974, (Macmillan, London and Basingstoke).

Williams, E E (1896), Made in Germany, (William Heinemann, London).

Williams, P (1991), 'The Laws of Health : women, medicine and sanitary reform, 1850-1890' in M Benjamin (ed), Science and Sensibility : gender and scientific enquiry, 1780-1945, (Basil Blackwell, Oxford).

Williams, R (1965), The Long Revolution, (Pelican, Middlesex).

Willis-Dixon, C (1986), The Institute : a history of the University of London Institute of Education, 1932-72, (Institute of Education, London).

Winstanley, M J (1983), The Shopkeeper's World, 1830-1914, (Manchester University Press).

Wood, E M (1965), A History of the Polytechnic, (MacDonald and Co., London).

Wood, E M (1932), The Polytechnic, and its Founder Quintin Hogg, (Nisbet and Co., London).

Worden, S (1986), 'From Brighton School of Art to Brighton Polytechnic : serving the community' in Brighton School of Science and Art, From Art School to Polytechnic : serving industry and the community from Brighton, 1859-1986, (Brighton Polytechnic).

Wrigley, J (1986), 'Technical Education and Industry in the Nineteenth Century' in B Elbaum and W Lazonick (eds), The Decline of the British Economy, (Clarendon Press, Oxford).

Zimmeck, M (1984), 'Strategies and Stratagems for the Employment of Women in the British Civil Service, 1919-39', The Historical Journal, Volume 27, Number 4.