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Basic skills and workplace learning: what do we actually know about their benefits?

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In this paper we review the literature on the impact of workplace basic skills training on individuals, as measured by their effects on wages and employment probability. In addition, we also examine studies on the returns to individuals of general training at the workplace. On the whole, the evidence suggests that better numeracy and literacy skills have a strong positive effect on individuals' earnings and employment stability, even when other relevant factors, such as qualifications levels, are taken into account. There is also good evidence to suggest that general training provided at the workplace has a positive impact on individuals' wages, particularly when this training is employer provided rather than off the job. However, the literature also suggests that improvement of basic skills levels in adults has very small or even no positive effects on wages and employment probability. We discuss the implications of these findings on the formation of government policy on basic skills provision. We also propose that there is a real need for more research in this area, not only in terms of longitudinal quantitative studies tracking the effects of basic skills programmes on firms and individuals but also in terms of detailed case studies focusing on specific training programmes and their impact at the level of the individual and firm.

Introduction

In common with other countries, the UK government has become increasingly occupied with the skills of the workforce, and especially those of adults. Policy documents emphasize that a very large proportion of the future workforce, not only in 2010 but also in 2030, is already employed, and a plethora of reports and initiatives have addressed themselves to ways of increasing what is seen as an inadequate level of workforce skills. The largest and most far ranging of these are the English government's 'Skills Strategy', which is occupied with workforce skills as a whole, and its 'Skills for Life' strategy, which sets ambitious targets for the numbers of adults who should improve their basic skills over the next five years. Both are backed by large sums of money that are being used to underwrite workplace training and formal basic

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skills classes (with further education colleges, in particular, having major financial incentives to recruit basic skills students and ensure they receive an approved qualification).

Underlying these developments are the familiar concerns with the emerging 'knowledge economy', and the changing demands of the workplace. However, a specific and powerful influence was the International Adult Literacy Survey (IALS), which was carried out in a range of countries (involving two major sweeps) under the auspices of the OECD (OECD, 1996). For example, in Britain it was conducted in 1996 on a national random probability sample of 3811 adults living in Great Britain and aged 16–65 (Carey *et al.*, 1997). These adults were tested on a range of literacy questions, designed to reflect everyday life and skills of relevance to the workplace. The results were grouped into five 'bands' or levels of proficiency and the proportions of the population performing at given levels reported. Level 1 (the lowest) was generally interpreted as reflecting less-than-functional literacy.

The UK results, when reported, indicated that around a fifth of the population was at this low level of literacy. These apparently disturbing findings led to the government setting up a major inquiry into adult basic skills, headed by Lord Moser (DfES, 1999), which in turn recommended a major public initiative, realized in 'Skills for Life' (DfES, 2001). Many of the specific findings of the IALS study have since been criticized on methodological grounds (see, for example, Carey, 2000; Blum *et al.*, 2001). However, the study does provide clear evidence that many adults do indeed have poor literacy skills, irrespective of the validity of exact IALS levels. This, and the conviction that this undermines productivity and growth, have ensured continuing support for adult basic skills training.

While unequivocal in its advocacy of major efforts to improve adults' basic skills, the 'Moser Report' also recognized the lack of good evidence in the area, and its neglect by academic researchers. One of its recommendations was for the creation of a national research centre that would be independent of government (though funded by it) and that would build up an evidence base on both the impact of basic skills problems and, even more importantly, on effective strategies for recruiting, motivating and teaching adult learners. This was duly accepted by the English government, and the National Research and Development Centre for Adult Literacy and Numeracy (NRDC) was established, involving a consortium of universities and practitioner organizations. (Education is a devolved function within the United Kingdom so the centre is an English not a UK-wide entity.)

Although most formal adult provision is in educational institutions (further education colleges, adult education institutes), all UK governments are currently prioritizing the development of basic skills tuition within the workplace, as a way of reaching the large proportion of adults who do not currently enrol in formal provision. Both through the NRDC itself, and through other research funds (e.g. the Teaching and Learning Research Programme of the UK's Economic & Social Research Council), a number of projects have been funded that, over the next few years, should begin to provide new evidence on effective learning environments in the workplace, and on the relative effectiveness and impact of different approaches. This is not before

time. As part of the preliminary work of the NRDC, the current authors carried out an in-depth review of literature on the impact of workplace basic skills training on individuals and companies. They found that the available research base is extremely poor, and had never been thoroughly reviewed and evaluated. Since both the feasibility and the value of such provision form a major plank of government policy, this is not merely disturbing but indicates the need to inform policy makers and researchers alike of the current state of well-established research findings (as opposed to anecdotal evidence).

This article presents the major findings of this research review as they bear on direct and measurable impacts on *individuals*. (For a review of the literature on the benefits to employers, see Ananiadou *et al*., 2003.) There is a growing body of work on both the types of basic skills instruction that are effective for adults, and on the types of workplace that most encourage informal learning (which may, in principle, include basic skills).[1] However, our review was related to the major objectives, and underlying rationale, of current government policies: namely that increasing the skills of individual workers has direct benefit for them and for the economy. We thus confined ourselves to material that directly measured individual skills or qualifications and/or individual benefits.

Hollenbeck (1996) provides a cost–benefit framework for the analysis of basic skills training that underscores that workers themselves are only one of the potential beneficiaries: employers, the education sector and the rest of society are also important. Of the eight hypothesized outcomes of training that he identifies—(higher) productivity; (higher) wages; non-wage compensations such as pensions; (less) worker turnover; safer workplaces; (higher) taxes; (improved) self-esteem and payments to trainers—five are of direct interest to the individuals receiving the training, namely higher wages, non-wage compensations, safer workplaces, less worker turnover and improved self-esteem. We report here on evidence relating to individuals' wages and employment probability, since we have not identified any well-founded studies relating to other outcomes. We discuss first the effects of improvements in basic skills and then, because of the limited data relating to basic skills per se, examine data that show the returns to individuals of general training in the workplace. In preparing this review we have carried out an extensive search of primary and secondary research material in English and French, although the main focus of the review is on evidence derived from the United Kingdom.

Individual gains from improvements in basic skills

In the following section, we summarize research on the links between basic skills in particular and individuals' earnings and employment. This body of evidence is powerful and also first made policy makers fully aware of the negative implications of poor basic skills levels in the workforce. It has also been the main foundation for predictions of the benefits to the economy of raising adults' basic skills (see especially Dearden *et al*., 2000). The most detailed estimates come from UK data, which rely primarily on the remarkably detailed data available from the National Child

Development Study (NCDS), one of the major longitudinal surveys of people living in Great Britain who were born at a particular point in time: in this case, between 3 and 9 March 1958. (For more details on the NCDS see, for example, Bynner & Parsons, 1997; Ferri *et al.*, 2003.) There have been six principal waves of data collection for the NCDS so far, the last one being in 2000. These children are now adults in their 40s, many with extensive labour market experience: and as well as data on formal educational attainment and employment histories, data from additional tests administered by researchers are available from different points in their lives. Of particular importance for the present purposes are the results of work carried out when respondents were 37 years old (1995). A random and representative 10% of the cohort (with 1714 respondents) were assessed using a specially developed literacy and numeracy test that provided a direct measure of their basic skills as adults.

Using these data, Bynner and Parsons (1997) discuss the impact of basic skills on various aspects of an individual's life, such as employment, health and family life. Below we summarize some of their findings that relate to employment, training and occupational achievement. In order to put these findings in context, however, it is worth clarifying that participants' scores in the literacy and numeracy tests were converted into four ability categories: 'very low', 'low', 'average' and 'good' for literacy and numeracy separately; findings have subsequently been reported in the literature in terms of these groupings, and it is to these that we refer in the review below. For the cohort as a whole, 6% were assessed as having very low and 13% as having low literacy skills; and 23% and 25%, respectively, as having low numeracy skills. Women scored better than men on the literacy items, and the reverse was true for numeracy.

The results of the survey fully support the general belief that low basic skills are associated with labour market disadvantages, as discussed below.

Qualifications achieved at age 37: half of the respondents with very low literacy skills had no formal qualifications; this proportion was higher than for those with low numeracy skills, where 31% of men and 23% of women had no formal qualifications (but note that the proportion of the population with low numeracy skills is approximately twice that with low literacy skills).

Employment and unemployment: 23% of men in the very low literacy group and 19% in the very low numeracy group reported being unemployed or sick at the time of the survey. The above percentages compare with 4% and 3%, respectively, in the high literacy and numeracy groups. The case of women is more complex as home care and part-time employment are more common. For the very low literacy group, 26% of women reported being engaged in home care, 31% were in full-time employment and 34% were in part-time employment. These proportions are 14%, 43% and 39%, respectively, for women in the high literacy group. Barely any women in this study defined themselves as being unemployed.

Employment history: the employment history of respondents from age 17 to 37 shows that men with very low or low literacy skills were more likely to be in full-time employment at an earlier age compared to their better-skilled peers. However, by the time they reached their mid-20s this picture had been reversed, with a higher

proportion of men with average or good literacy skills being in employment compared to those with low or very low skills. For example, at age 31, 75% of men with very low literacy skills were in full-time employment, compared with over 90% of men with good literacy skills. There was a less strong effect of poor numeracy skills on employment history. A similar picture is found for women, i.e. those in the very low or low literacy groups were the first to enter the labour market but also the first to leave it, with just one in three women with very low or low literacy skills being in full-time employment between the ages of 29 and 36.

Work-related skills: respondents were asked to report whether they thought they were 'good', 'fair', 'poor' or 'did not have' each of a list of 17 work-related skills drawn up by the (then) UK Department of Employment. A lower proportion of men and women with poor literacy and numeracy skills perceived themselves to be good at these work-related skills. The differences between men with good and very low literacy or numeracy skills were largest for the following work-related skills: writing, reading plans, computing, teaching, supervision, maths calculations, organization, comprehension and decision making. For women, the skills in which those in the two extreme groups differed most were: writing, reading plans, computing, support/advice, maths calculations, finance and comprehension.

Promotion at work: between the ages of 23 and 37 almost two-thirds of men and three-quarters of women with very low literacy skills had never been promoted, compared to under one-third of men and two-fifths of women with good literacy skills. There was a smaller difference between the two extreme groups with respect to numeracy skills for men, although for women the difference was, on the whole maintained, with approximately 60% of women in the low numeracy group never having been promoted compared to 34% of those with good numeracy skills.

Earnings: since literacy and numeracy skills were found to have an effect on occupation and this in turn obviously affects level of income, the analysis of earned income presented by Bynner and Parsons refers only to respondents who left school at 16, in an attempt to control in part for the effect of occupation. (All other results reported are for the complete 10% sub-sample.) The data show that 42% of men with very low and low literacy fell in the low-income group (less than £200 per week) compared to 24% for those with good literacy. The respective figures for women were 53% (low or very low literacy) in the low-income group (less than £150 per week) compared to 39% of those with good literacy. An even more marked effect was found with respect to numeracy skills for men: 49% of men and 52% of women with very low numeracy fell in the low-income group compared to 19% of men and 30% of women with good numeracy skills.

Further, Parsons and Bynner (1998) investigated the influences or antecedents of poor basic skills, again using data from the NCDS. They report a strong relationship between poor basic skills in adult life and early childhood risk factors, such as poverty and disadvantage (measured, for example, by whether children received free school meals or lived in overcrowded accommodation). There thus seems to be a circular relationship between disadvantage and poor cognitive skills in childhood, and poor basic skills, poverty and social exclusion in adult life (for more details on the

relationship between basic skills and social exclusion see also Parsons & Bynner, 2002).

These results confirm that the current economy rewards the skilled and penalizes the low skilled: but does not tell us how far this has changed in recent decades, or is likely to in the future.

Dearden and colleagues (2000, 2002) have extended the analysis of skills and labour market rewards by examining the returns to a wide range of British academic and vocational qualifications, as well as the returns to basic literacy and numeracy skills, and have also examined earnings effects for the whole population (rather than just those who left school at 16) using data from both the NCDS 10% sub-sample discussed above and from the IALS. Their analysis used multivariate techniques to estimate how much basic skills levels affect the adult population as a whole, and to see whether the skill levels displayed by adults exert an independent influence over and above the impact that is captured by measuring qualifications and early school achievement measures.

In common with researchers worldwide (see, for example, OECD, 2002), Dearden *et al*. found clear earnings and employment returns to qualifications—the more so the higher the level. Our particular interest, however, is in their analysis of the impact of literacy and numeracy on wages. They found that individuals with average or above average numeracy skills[2] can expect, on average, to earn between 15% and 19% (according to the NCDS and IALS, respectively) more than individuals below this level, *when not controlling for any other factors that may influence earnings*, such as family background (i.e. mother's and father's education) or education level. The premium for literacy at this level is only slightly smaller, at about 15% for both data sets.[3] (The 'low' and 'very low' categories used in the NCDS studies can be roughly equated with below IALS Level 1 and are reported as such by the researchers.)

The impact of people's basic skills levels on earnings is explained partly by their association with qualifications (which partly reflect and indicate skill levels, but also have independent, separate effects on earnings) and with other background variables. However, strong effects on earnings remain, even when controls are introduced for factors such as family background, ability at age 7 and 16 and education level achieved. These results suggest that *for numeracy skills, there is still an effect of around 6–7% for those with skills at or above Level 1*. The evidence on literacy is more mixed, however, as results from the two data sets differ substantially. The results are presented in more detail in Table 1: column 1 shows raw effects; column 2 controls for a variety of family background variables[4] plus own education level achieved; and column 3 controls for measured ability at ages 7 and 16.

Turning to the impact of basic literacy and numeracy skills on the probability of being in employment, Dearden *et al*. found that having Level 1 numeracy skills is associated with an extra 5% probability of being in employment, not controlling for any other factors; this figure is consistent for both the NCDS and IALS results. For literacy, the figures between the two studies differ even before controls are introduced, with NCDS results indicating that individuals with Level 1 literacy are about 5% more likely to be employed compared with their less skilled peers, while the IALS results

Table 1. Wage effects associated with Level 1 numeracy and literacy skills. Taken from Dearden *et al.* (2000)

	Raw effects	With some controls	With full controls
Numeracy Level 1			
IALS estimates	0.187	0.066	
NCDS estimates	0.147	0.069	0.057
Literacy Level 1			
IALS estimates	0.152	0.114	
NCDS estimates	0.148	0.026	0.013
Controls (×=control introduced)			
Family background		×	×
Age 7 ability			×
Age 16 ability			×
Education level		×	×

Table 2. Employment effects associated with Level 1 numeracy and literacy skills. Adapted from Dearden *et al.* (2000)

	Raw effects	With some controls	With full controls
Numeracy Level 1			
IALS estimates	0.056	0.020	
NCDS estimates	0.045		0.029
Literacy Level 1			
IALS estimates	0.134	0.095	
NCDS estimates	0.051		0.002
Controls (×=control introduced)			
Family background		×	×
Age 7 ability			×
Age 16 ability			×
Education level		×	×

suggest that they are 13% more likely to be in employment.[5] Again, the authors provide further analyses controlling for factors such as education level, ability at 7 and 16 and family background, as presented in Table 2.

One of the most interesting findings from both the NCDS and the IALS data is that there are significant differences between men and women in the labour market returns to basic skills. Such gender differences are certainly consistent with other studies of earnings and employment patterns, and also, as we shall see below, with the few studies that exist of qualifications and skills achieved as adults. Tables showing raw effects are shown in the endnotes:[6] but, in summary, they suggest that the wage effects of higher numeracy skills are greater for men than for women, and that the reverse is true for literacy, while, in terms of employment, higher numeracy skills seem to have more impact on women's employment chances than men's.

In summary, it appears that whether or not people have numeracy skills below Level 1 has an impact on both earnings and employment rates. The effect is still quite strong even after other factors that may have an impact on these two variables have been taken into account. The evidence on literacy is more mixed, as the two data sets examined suggested substantially different effects on earnings and employment rates. However, in general, individuals with better mathematics and reading skills (as measured at age 16 or at age 37) have higher earnings and are more likely to be in work, even when factors such as a person's attitudes and 'soft skills' are taken into account. Some of this positive association is due to the higher qualifications that individuals with better literacy and numeracy skills possess, but not all by any means.

So people with poor basic skills are indeed more likely to experience unemployment, be in low-paid jobs, and have fewer opportunities for progression and promotion in their jobs. This is, of course, consistent with the results of multiple cross-sectional surveys; but what these analyses add is not merely a much more detailed picture of the impact but also evidence that low basic skills levels, as adults, have effects over and above those created by, for example, leaving school early without formal certificates. These data are, by necessity, historical. However, it also seems likely that they will be replicated as strongly, if not more, for young people now entering the workforce. One can easily exaggerate the extent to which we are all becoming 'knowledge workers': the fastest growing job categories are in the care and service sectors where 'soft skills' are critically important (Turner, 2001). However, in a modern economy, increasing numbers of jobs require quite advanced levels of literacy and numeracy; and in the United States, for example, there is clear evidence that English and maths attainment (measured on standardized tests) is becoming increasingly important for employment (Murnane *et al.*, 1995). Similarly, workplace studies indicate growing demand for intermediate-level mathematical skills and applications (Hoyles *et al.*, 2002).

As emphasized above, it is results such as these that have persuaded politicians and policy makers of the importance of raising adults' basic skills levels, and so improving their earnings (and, by extension, the productivity and wealth of the economy). But can we, in fact, find evidence that basic skills improvements actually have these effects?

The impact of basic skills improvements

The most sophisticated attempts to model the results of improving adults' basic skills again use NCDS data from the United Kingdom. One study in particular, by Machin *et al.* (2001), sets out to examine whether *improvement* in literacy and numeracy since age 16 has any significant impact on earnings. Four measures were used: (i) asking respondents if they had followed a literacy or numeracy course between survey dates; (ii) comparing scores of literacy and numeracy tests at ages 16 and 37 for the 10% (1714 respondents) who took tests at age 37; (iii) the acquisition of any qualifications between the ages of 22 and 33 by low-qualified individuals (below Level 1); and (iv) self-reported changes in numeracy and literacy skills over the last decade.

Of all these measures, the clearest effects were found for self-reports. Individuals who reported that their skills had improved in the period of time since the last sweep of the survey (between a quarter and a third of the sample) earned more than those who did not believe that their skills had improved. For example, the effect of self-reported improvement in numeracy skills on earnings for males was approximately 3%, whereas for women it was 11%. Women who reported improvement in skills were also less likely to be unemployed.[7]

For other measures, however, the results were largely insignificant. Taking a numeracy course was, for men, negatively associated with earnings, perhaps because of self-selection into such courses: other coefficients for course taking were insignificant (though less than 1% had actually taken a literacy or numeracy course). Direct measures of skill improvement using scores at 16 and 37 showed no significant effects for women: for men, there were some positive effects from improved numeracy but *only* for those who were not very low achievers at age 16. Finally, and surprisingly, there did not appear to be any positive outcomes in earnings or employment for poorly qualified men and women who gained additional qualifications in their 20s.

As already noted, there are very few data sets that allow one to examine the actual impact of basic skills training on individuals' earnings. Outside the United Kingdom, Hollenbeck (1996) provides an estimate of the wage impact of basic skills training for US workers, based on two data sets: that of the 1991 National Household Education Survey (NHES), a one-off survey from which he was able to estimate numbers participating in 'basic skills' programmes as opposed to other workplace training, and the Current Population Survey (CPS) conducted monthly by the Census Bureau on behalf of the US Department of Labor. His estimates are that, over the entire population (males and females), workplace basic skills training increases earnings by about 17% (NHES) or 11% (CPS). Controlling for type of industry and occupation, the effects still remain substantial at 13% and 8%, respectively, for the two data sets. There are, however, inconsistencies between the two data sets when one examines the effects separately for males and females.

Implications for adult learning and its benefits

The evidence on the work-related effects of individuals' basic skills relates almost entirely to learning and skills acquisition, which itself took place outside the workplace. It is nonetheless quite detailed in respect of both wages and employment, and allows one, moreover, to distinguish between literacy and numeracy; and, in some cases, to look at the effects of changes during adult life. Given the major differences revealed between the better and less skilled, it is not surprising that governments have made basic skills programmes a priority. But are they justified in expecting that such programmes will greatly improve individuals' life chances and boost the economy?

This is certainly the assumption that they do make, and it underlies the strong policy support for adult basic skills instruction in most developed countries. However, it is a risky one. Improved skills will certainly improve people's lives in many ways but it is not obvious that they will be direct economic ones. Policy makers rely, in their

predictions, on academic models that use the wage and employment advantages associated, in the current labour market, with individuals of a given skill level, and then assume that, if others reach that same level, they will enjoy the same benefits (see, for example, Bynner *et al.*, 2001). So, for example, extrapolating from existing skills-related differences in employment rates and earnings, one arrives at figures that suggest that raising the population's basic skills will result in 100,000 more employed UK adults (if all reach Level 1 numeracy) and in increases in the wages bill (i.e. employed adults' earnings) of £7.27 billion (Bynner *et al.*, 2001: effects of numeracy improvements, 2000 prices).

But it is not at all evident that this will actually occur (Wolf, 2002). In fact, there is evidence that suggests the opposite. As we saw above, Machin's analysis of the results of basic skills changes found that, while those who reported improvements in their own skill levels also showed gains, those who had measured improvements (in terms of scores at 37 compared to 16) did not. Moreover, recent work in both the UK and the Swedish labour markets shows that courses followed or low-level qualifications acquired in adult life do not deliver wage or employment benefits in any predictable or reliable way.

Jenkins *et al.* (2003) studied whether qualifications obtained by adults between the ages of 33 and 42 had an effect on their wages at the end of this period, controlling for a wide range of other factors.[8] In general, there were no effects on wages. The exception was men who left school with only low-level qualifications (e.g. lower grade CSEs) and who acquired *degrees* in their 30s or early 40s. They earned more than their peers who had not engaged with lifelong learning. The research also uncovered employment effects. Gaining a qualification between 1991 and 2000 was associated with a significantly higher probability of being in employment in 2000 among women who were out of the labour market in 1991. These very weak wage effects found here are also consistent with weak effects previously found for qualifications acquired in people's 20s (Machin *et al.*, 2001).[9]

Similar results have recently become available for Sweden (Ekström, 2003). Here, too, there has been strong support for adult education: not only in basic skills (where comparative data suggest that the population has fewer problems than do those of, say, the United Kingdom, France or the United States) but also upper secondary courses. The expectation on the part of policy makers had been that labour market effects of adult education will be clear and positive: but analysis of the Swedish Longitudinal Individual Data (LINDA) for 1983–2000 indicate no positive earnings effects for Swedish-born males or females, although there are significant and positive effects for female immigrants.

These findings may appear puzzling given the strong effect of measured skills on wages, and the importance of qualifications obtained in youth as predictors of later life chances: but they underline the danger of extrapolating to adults from information on returns to qualifications and skills obtained by young people. If governments are going to use data on the lower earnings of low-skilled adults as a basis for supporting basic skills programmes for adults, then we think they must do so in the knowledge that estimates of effects based on the current earnings of the more highly skilled offer *upper*

bounds to the likely impact, both for the individual learners themselves and for their employers.

A major reason for this is the problem of *endogeneity*, i.e. the fact that the estimates may be only partly of returns to (in this case) basic skills themselves, and partly reflect unobserved characteristics of the individuals studied. In other words, rewards—such as higher wages, or lower chances of unemployment—may appear to be linked to the skills or qualifications an individual possesses, when they are actually, in whole or in part, the result of other unobserved characteristics, such as innate ability. If differences between high- and low-skilled individuals are only partly the result of the skills, then, equally, improving skills in the less proficient group will not eradicate the differences.

This endogeneity problem is very well recognized in the social sciences in general, and the use of panel or longitudinal studies—i.e. studies collecting data at two or more points in time—and a focus on the results of *changes* in skill levels is for that reason highly desirable. Such panel studies are preferable to cross-sectional estimates of links between skills levels and wages or employment status. This is not to say that these studies can always deal with all these issues perfectly: in the United Kingdom, for example, we have very good panel data for individuals but, even here, the data sets are not large enough to provide detailed information on the results of improving one's basic skills during adult life. We belabour these points because we conclude from this review that there is a real and urgent need for more research. The evidence on the effects of *basic skills* improvement remains limited, simply because we have, to date, very few cases, in the major data sets, of people who have actually undertaken basic skills classes as adults.

Because so little direct evidence is available on the results of basic skills instruction for adults, we now turn to information on workplace training, and its effects on individuals. Here, the data are more numerous; and some clearer effects are to be found.

Individual gains from workplace training

In this section, we summarize the major findings with respect to the financial gains from workplace training for individuals; in some cases, these gains can also be seen as indicative of likely productivity gains for employers, although we will not be discussing this aspect of the research here. In general—though not universally—the literature finds strong evidence of wage effects of training for individuals. Good overviews of this literature include Blundell *et al.* (1996) and Greenhalgh (2002). We summarize the most important studies here.

Blundell *et al.* (1996) present a thorough and methodologically aware analysis using NCDS data from 1981 to 1991, covering training over a 10-year period when respondents were between the ages of 23 and 33. The NCDS questionnaire in 1991 asked about courses in the previous 10 years that led to qualifications, and about other training courses during this time designed to help develop work skills, and the research focused on the effects of both types of courses on wages. Once those not in

employment in 1991 and those with missing data were excluded, the sample consisted of about 1600 men and 1100 women.

The research[10] suggested that employer-provided training in the current job boosted the real wage of men by, on average, some 3.6% (for on-the-job training) and 6.6% (for off-the-job training). For women the effects of training in the current job were 4.8% (on-the-job training) and 9.6% (off-the-job training). Training in previous jobs also had a positive effect on wages. For men the average effects of training in a previous job were 5.7% (on-the-job training) and 5.4% (off-the-job training), while for women they were 4.6% (on-the-job training) and 6.2% (off-the-job training). These estimates refer to training that did not lead to a qualification. Returns were higher if a qualification was obtained, although only higher vocational qualifications (such as professional qualifications, nursing qualifications, HNDs, etc.) had statistically significant effects. Higher vocational qualifications boosted male wages by about 8% on average, and female wages by about 10%.

One interesting implication of the findings, with possible implications for basic skills training, is that obtaining a vocational qualification (as opposed to an academic one) on an employer-provided course provides a higher return than obtaining a qualification on a non-employer-provided course. For example, a higher vocational qualification raises male wages by some 15% for an off-the-job employer-provided course compared to 8.5% if the course was not provided by the employer.[11] Overall, the research suggests a wage gain from training of around 5%; and that training transfers readily across employers. The main limitation of this study is that it relates to a single cohort of relatively young workers, so it is not clear whether the results would also be applicable to other age cohorts.

Arulampalam *et al.* (1997) also used data from the NCDS and looked at the effects of both training and educational courses on wage growth, for males only, over the period 1981–1991 (NCDS sweeps 4 to 5).[12] The study is carefully constructed but provides only 878 cases after those with missing data are dropped. The results (with multiple controls) indicated that receipt of employer-based training increased wages by about 11% over the period 1981–1991 (comparing those who experienced at least one training episode to those receiving none). Compared to Blundell *et al.*, these results confirm the value of *employer-provided* (as opposed to self-funded or government-funded) training but indicate lower transferability: employer provision of the (most recent) training (or educational course) was found to have a large positive effect on earnings growth, while non-employer provision had no such effect. Moreover, the effects of employer-provided training held only for those who stayed with the employer—they received an average 12% wage increase.

Booth (1993) used data from a national survey of 1980 *graduates* carried out in Britain in 1986–1987. The survey contained information about employer-provided training received by respondents since their graduation in 1980.[13] For men, external courses in the current job, days of training in the previous job, and any form of training in earlier jobs significantly increased earnings growth between 1980 and 1986, while the number of days of training in earlier jobs had a significant negative impact. For women, only training days in the current job or internal courses in the

previous job significantly increased earnings.[14] Overall, training had a considerable impact on earnings; but it needs to be borne in mind that the sample consisted of graduates only, so that the results do not necessarily generalize to the population as a whole.

A cross-sectional analysis of micro-data on the effects of training on wages in seven developed countries is described in OECD (1999).[15] There was a significant positive relationship between training and wages for five of the countries: Australia, Canada, Germany, Italy and Britain, with no significant effects for France and the Netherlands. For France, Italy, the Netherlands and Britain there was also a significant positive relationship between wages and the training of less educated workers, where a less educated worker was defined as below ISCED Level 2, meaning that they had not completed upper secondary education. This finding provides some support for the proposition that the less well educated, when trained, obtain larger wage gains: but the absence of longitudinal data limits its usefulness.

Groot (1995) provides evidence from the Netherlands that the wage returns to training for individuals vary according to the type of training provided.[16] The training data covered three different types of training: technical training, economic/administrative training (defined as covering 'economic, administrative and commercial training') and other training (encompassing agricultural training, medical training, teacher training, legal training, science training, government/public admin training and various other kinds of training). OLS wage equations, including controls for schooling, an IQ variable, gender and experience, suggest that technical training increased wages by about 4%, economic/administrative training by some 14%, and other training by about 12%, while more sophisticated models also found wage gains from technical training (for those who participated in it) to be the lowest. However, recall bias may be a serious issue in this study. (Krueger & Rouse, 1994, who were able to compare company records with trainee recall, note major discrepancies and caution accordingly against possible bias in self-reported data.)

Lillard and Tan (1992) carried out an extremely thorough study of training and its effects on male wages and employment in the United States using five different data sources—the Current Population Survey (CPS), three cohorts of the National Longitudinal Survey (NLS) (young men, old men, women), and the Employers Opportunity Pilot Project (EOPP). The data sources cover the period up to the early to mid-1980s. The main drawback, in interpreting the results, is that the earnings results do not control for possible endogeneity.

The analysis of earnings focused on the CPS and the young male cohort of the NLS. They found that the earnings effects of training varied both by the type of training and who was providing it. Once again, as suggested by the UK data, company training had the largest effects on earnings, and this persisted over a 13-year period. Other types of training had smaller effects and lasted for 8–10 years. Managerial training increased earnings the most, but its effects did not last as long as that for semi-skilled manual workers (12 years and 15 years, respectively). Training also had an impact in reducing the likelihood of experiencing unemployment, with company training again having the longest-

lasting effects, of some 13 years, whereas regular school sources of training effects disappeared within seven years.

Bartel (1995) is an econometric case study. Estimates are presented of the effects of training on wage growth with data from the personnel records of a large US manufacturing company over the time span 1986–1990. The use of personnel records provides an interesting alternative approach to the usual one of estimates from a large-scale survey.[17] Bartel found that the number of days of training did have a positive wage effect. Distinguishing between three different types of training—core training (managerial and leadership programmes), employee development (covering, for example, oral presentations, effective writing, time management), and technical programmes (such as quality control, manufacturing practices, computer programming)—she found that the largest wage effects were for core training, which was fractionally ahead of employee development, with technical training having the lowest (but still statistically significant) returns.

Training and job mobility

Studies on the benefits of training to employers have generally found a strong association between company-provided training and lower workforce turnover (see Green, 1997, for a review of several US and UK studies). Individual-level data generally confirm this association: those who are trained are less likely to leave. For example, Booth and Satchell (1994) investigated the effects of apprenticeship training on job tenure in Britain, again using data from the NCDS. The researchers utilized a subset of the data consisting of young men who had left school at the age of 16. Women were excluded from the analysis because relatively few of them entered an apprenticeship. Among the sample of young men who left school at 16, some 43% began an apprenticeship in their first job.[18]

The main result was that completing an apprenticeship substantially reduced the exit rate from the first job into each of the three possible destinations, while failing to complete an apprenticeship increased each exit rate compared to the base of no apprenticeship training. These effects were statistically significant even when a range of control variables was included.

Elias (1994) also presents an event history analysis of the probability of job termination.[19] Controlling for a range of factors, it was found that training had a negative effect on the probability of a job ending. The effect was weak for males and not statistically significant, but for women training had a statistically significant effect (at the 1% level) on mobility, reducing the propensity to leave an employer. Evaluated at the sample mean, the provision of formal training reduced the probability of a job termination by about 7% for women. The small size of the sample is one concern about this study. There is also the general problem of whether training is lowering the propensity to quit or whether employers are selecting for more training those likely to stay.

Dearden *et al.* (1997) provide a very detailed investigation of the links between training and job mobility in Britain. Two data sets were used: the NCDS and the

Quarterly Labour Force Survey (QLFS). Both have advantages and disadvantages, and are in many ways complementary to each other. The NCDS has substantial information but on a single cohort and a long time span. The QLFS is larger but covers a shorter time span (the panel element consists of people for five quarters) and less detailed background variables.[20] For men in the NCDS, and controlling for other individual characteristics, it was found that receipt of employer-provided training reduced job mobility by some 3%, while other work-related training increased job mobility by about 2.5%. In the QLFS, for men, employer-provided training leading to a qualification reduced job mobility by some 4%, whereas other work-related training (also with a qualification at the end of it) raised by 1.8%. For women, employer-funded training lowered mobility by 1.6%. In general, the impact of training was fairly small compared to employer size, industry, age of the worker, unionization and whether the job was full-time or part-time.

From the evidence presented above, it seems clear that a great deal of the training currently provided by employers has a major direct impact on recipients' wages; and that the impact this is generally more marked for employer-provided training than for training taken off independently. It seems reasonable to conclude that these wage gains reflect, at least in part, substantive changes in the productivity and value of the employee to the employer.

What is more difficult is to extrapolate to the likely effects of increasing training (e.g. through subsidies or legislation), let alone to the effects of something as specific as government-funded basic skills training delivered in the workplace: a form of provision which, as discussed earlier, is such a high priority for many governments. The training described here has been initiated by employers: they have seen its benefits, and also selected its recipients. It is possible, for example, that in many cases training is associated with wage gains because it is targeted on those whom employers wish to promote or re-deploy: just as it is likely that more training will occur in firms that are successful and expanding than in those that are facing difficulties—of their own making or because of changes in their markets and environment.

Key evidence gaps

In reading this literature review it should be apparent that our knowledge of the effects of adult basic skills provision, in and out of the workplace, is fragmentary and highly inadequate; and that even in the case of more general training for adults the evidence base remains difficult to interpret. Given the importance of the subject, it is really quite remarkable how limited the studies in this field of enquiry are. Fundamentally, the lack of good research stems from the absence of good data—both quantitative and qualitative. Here, we draw together what appear to be some of the key gaps in the evidence.

Baseline descriptive information on the extent and nature of basic skills training provision in the workplace is highly inadequate. In addition, in order to gain a proper understanding of basic skills tuition programmes and their effects, longitudinal (panel) data are required so that the effects of the training programme can be tracked

over time. The data set would clearly need to contain both individual- and firm-level information both on training at the workplace and on business performance outcome measures such as productivity, turnover and financial performance. If such data were to become available, for basic skills and for training more generally, it would enable robust quantitative estimates of the effects of such training to be obtained.

While large data sets of this type are a necessary precondition for evaluating the general effects of basic skills (and other) training, there is a limit to what can be learned in this way. Detailed firm-level studies are also needed if we are to understand the precise circumstances in which basic skills programmes impact on different aspects of the workplace and the employees receiving the training, and how these effects are related to programme features. Here, too, the research base is extraordinarily small. The tiny number of good quantitative studies that look at the impact of basic skills, or other training, at firm level all use data from US plants (e.g. Krueger & Rouse, 1994, 1998). These will, however, be supplemented over the next few years by a number of studies currently being funded within the United Kingdom (and referred to in the Introduction), including one involving the current authors.

The one area where research studies of good quality have been conducted in the past on basic skills in Britain is the wage and employment effects of poor basic skills for individuals. Much of this work has drawn on cohort data from the National Child Development Study (NCDS), a cohort born in 1958. The main studies that have been conducted cover cohort members' lives up to the early to mid-1990s: and they are seriously constrained by the fact that testing of the cohort as adults has been restricted to a 10% sub-sample. Similar data are now (2004) being collected for the BCS70 cohort—a cohort born during one week in 1970, and this will include testing the adequacy of individuals' literacy and numeracy skills. Even here, of course, the findings, when available, will relate only to a single cohort of people in their early 30s, all of whom are UK born.

To summarize, we suffer from an absence both of large-scale survey data and of well-constructed firm-level studies. As so often in the past, government policy is being made more on the basis of theoretical ideas about how the world is changing and what 'should' work than on the basis of evidence.

Notes

1. See especially Rainbird *et al.* (2004); Evans *et al.* (2002); Billett (2001).
2. For the purposes of the analyses reported here, Dearden *et al.* have equated the IALS results to the NCDS ones, and through these to the current national levels in the United Kingdom. This was done in a purely practical way by the researchers: that is, they have set out to preserve the same basic distribution of attainment levels in the population. Levels here therefore refer to the five current national ones in the United Kingdom: Entry 1–3, Level 1 and Level 2. As an indication of the standards these refer to, Level 1 in literacy and numeracy corresponds to the reading and mathematics level expected from 11 year olds in the school National Curriculum; for full details see QCA (2000).
3. The population is partitioned differently for these two comparisons, since only about a fifth of the population, based on NCDS estimates, has literacy skills below Level 1, compared to about a half for numeracy.

4. For the NCDS, controls were family background (i.e. parents' educational level, social class, financial difficulties in family when child aged seven) plus various childhood variables (school type, parental interest in education) and ability at age seven. For IALS data, a more limited set of background variables was available/used.
5. These differences may be partly explained by the fact that the IALS covers the entire age range (16–64) and therefore has a lower aggregate level of employment than the NCDS sample, which is confined to a particular one-year cohort.
6.

Table 3. Raw wage effects associated with numeracy and literacy skills, by gender

	Raw effects
Numeracy Level 1	
Males only	
IALS estimates	0.242
NCDS estimates	0.148
Females only	
IALS estimates	0.101
NCDS estimates	0.124
Literacy Level 1	
Males only	
IALS estimates	0.152
NCDS estimates	0.090
Females only	
IALS estimates	0.218
NCDS estimates	0.135

Table 4. Raw employment effects associated with literacy and numeracy skills, by gender (Dearden *et al.*, 2000)

	Raw effects
Numeracy Level 1	
Males only	
IALS estimates	−0.035
NCDS estimates	0.050
Females only	
IALS estimates	0.120
NCDS estimates	0.021
Literacy Level 1	
Males only	
IALS estimates	0.120
NCDS estimates	0.062
Females only	
IALS estimates	0.180
NCDS estimates	0.026

7. The results reported are for analyses with controls for family background, parental interest, schooling, age 7 and 16 attainment, qualifications and 'soft' skills.
8. Including educational qualifications obtained up to age 33, early attainment scores on maths and reading tests at age 11, family background (such as social class and educational level of parents), type of school attended, and characteristics of the job in 2000 (public/private sector, size of organization, union membership). Potential endogeneity bias was allowed for by running equations in first differences as well as in levels.
9. Both the Jenkins and the Machin studies used data from the UK birth cohort studies.
10. Estimating the returns to training is complicated by the fact that the recipients of training may differ from non-recipients with respect to unobserved variables. A standard method for dealing with this issue is to use a model in first differences, i.e. to focus on wage *growth* rather than wage levels (just as, in looking at the effects of basic skills acquisition, it is preferable to look at the effects of changes in skill). This is essentially what Blundell *et al*. do here, although they use a more general technique which they refer to as quasi-differencing. Heckman selectivity corrections were used to allow for the endogeneity of the initial wage, as well as employment status and occupation.
11. The researchers also show that the skills enhancement which training delivers tends to depreciate over time. Returns to training courses taken before 1989 were substantially lower than those recent courses taken in 1989–1991.
12. Controls=ethnic background, early test scores (maths and reading at age 11), trade union membership, sector/firm type, marital status, regional unemployment rate, qualifications by 1981. They also controlled for endogeneity bias using a probit for selection into education/training.

13. For the current job, data were provided on several sorts of training including on-the-job training, courses within the organization, courses outside the organization, and the number of days of training. There was also information on training in their previous job and in earlier jobs. The sample consisted of approximately 2300 men and 1300 women. The potential endogeneity of training was dealt with both by using the Heckman two-stage procedure and also by estimating equations in first differences (earnings growth).
14. All these estimates controlled for a range of individual characteristics including age, marital status, number of children, educational background, months unemployed and months out of the labour force, current job tenure as well as type of university attended, class of degree and further education since 1980.
15. For each country the logarithm of the gross hourly wage was regressed on explanatory variables including age, gender, hours of work, nature of contract, organization size, public-sector employment status and industrial sector. Samples were confined to employees aged 25–54 years. The endogeneity of training was controlled for through Heckman's two-stage procedure (i.e. including among the explanatory variables a term summarizing information obtained from a separate probit estimate of the likelihood of receiving training).
16. He used data from the 1983 Dutch Brabant Survey, which contained information on individuals who were in the sixth grade of primary school in 1952 (i.e. were then aged 11 or 12) and who were re-interviewed in 1983. In 1952, data on social background and IQ were gathered; in 1983 the questions covered education after primary school, current job status, earnings, and vocational training. Groot used a sample of 1075 individuals who were wage earners in 1983. Wage regressions were estimated by both OLS and using a general switching regression model, designed to allow for self-selection into certain types of training.
17. Clearly the disadvantage of the approach is the potential difficulty of knowing how far results can be generalized, but there are some advantages. One is that the training data should be more precise because they have been obtained from documentary records rather than the hazy recall of individuals responding to surveys. Secondly, there is no bias from differences in training varying across diverse firms. Bartel estimated a wage growth equation to eliminate person-specific fixed effects; she used an incidence of training equation to control for the selection of certain types of individual into training programmes.
18. Booth and Satchell modelled the length of time (in months) until the respondents' first job came to an end using an event history model with competing risks. The data came from the fourth follow-up of the NCDS sample that occurred in 1981 when cohort members were 23 years old. The competing-risks framework was considered appropriate because a person's first job can end in several different ways: a voluntary quit into another job, a voluntary quit into unemployment, and involuntary termination of employment. Controls were for type of school attended, for test scores in maths and comprehension at age 16, for sector of employment (public or private) and for whether the person had a disability.
19. The data came from the 1986–1990 Social Change and Economic Life Initiative (SCELI), a major research project conducted within six local labour markets in Britain (Aberdeen, Coventry, Kirkcaldy, Northampton, Rochdale and Swindon). In each locality a random sample of about 1000 people aged 20–60 were interviewed about their work histories. Elias used data from one of the localities—Rochdale—only and modelled the probability of job termination on monthly work history data. Job termination in a person's work history involved a change of employer or a transition to a non-employment state. The sample consisted of 171 males and 258 females. Controls included job tenure, the age of the respondent, part-time work, trade union membership, large employer (500+ employees), and working in a managerial, technical or professional job.
20. Several different approaches were used. The main results were obtained from what they characterize as a 'before and after' approach in which the impact of training in an earlier period on the probability of moving jobs in the following year was assessed. More elaborate models were also tried, such as instrumental variables (to allow for situations in which the

unobservable individual characteristics that explain likelihood of moving jobs are correlated with previous training), sequential models and models in which training and mobility were determined simultaneously.

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