National Research and Development Centre
for adult literacy and numeracy

RESEARCH SUMMARY

THE DIGITAL DIVIDE: COMPUTER USE, BASIC SKILLS AND EMPLOYMENT

A COMPARATIVE STUDY IN PORTLAND, USA AND LONDON, ENGLAND

John Bynner, Steve Reder, Samantha Parsons and Clare Strawn

OCTOBER 2008

INTRODUCTION

The context of this comparative study is the rising importance of the use of and access to computers as part of contemporary employability. In turn computing skills, increasingly referred to as Information and Communications Technology (ICT) or 'digital' skills, also connect with the basic skills of literacy and numeracy. There are consequently divides between the 'haves' and the 'have nots', in relation to digital skills, basic skills and employment. It was these three divides that the study set out to investigate in the North American and British context.

At the core of the processes creating these divides is educational attainment. High educational achievers – i.e. those on the positive side of each divide in both countries – tend to show the highest literacy and numeracy levels as well. Those on the negative side tend to show the lowest levels, with poor literacy proficiency a crucial factor.

In the USA a consequence of poor educational progress in the early years is likely to be failure to complete high school, with drop out at any age from 15 onwards, depending on the minimum school-leaving age, which differs from state to state. A second chance to achieve high school credentials comes through the General Education Diploma (GED). Rather than return to high school to graduate in the conventional way or, in the case of immigrants, start high school from scratch, adults can attend adult education classes in preparation for the GED. The provision will often include significant literacy and numeracy components as core foundations of the curriculum to follow. The GED is meant to supply the student with a platform for employment equivalent to the high school graduation certificate.

In England policy concern focuses on the increasing difficulty young people with poor skills often have in gaining and sustaining employment in the contemporary labour market. In UK terms this is typically characterised as six months or more between the ages 16 to 18 'Not in Education, Employment or Training (NEET)'. Hence, poor literacy and, increasingly, lack of digital competence can lead to marginalisation and social exclusion. Basic skills courses in colleges or workplaces may supply a route back into education for some but usually not until their twenties.

PORTLAND AND LONDON

The study capitalised on the availability of comparable longitudinal research resources relevant to the target populations in the USA and UK. In the USA the Longitudinal Study of Adult Learning (LSAL), covers those living in the metropolitan area of Portland, Oregon. In the UK we used a part of the 1970 British Cohort Study (BCS70) – those living in Greater London and the urban parts of the South-East of England (referred to for convenience as the 'London study').

The Portland study comprises a representative sample of all adults proficient in English aged 18–44 who in 1988 were living in Portland and had failed to complete high school. These people have had annual or biannual interviews which included literacy assessments using the US Test of Applied Literacy Skills (TALS). This process has been completed six times since 1998.

The BCS70 sample comprises all 17,000-plus individuals born in Great Britain in a single week in 1970. The sample has been interviewed at ages 5, 10, 16, 26, 30, 34. At age 34, as part of a comprehensive interview, there was also a literacy (and numeracy) assessment based on a reduced form of the tests used in the 2002 Skills for Life National Baseline Survey.

The fact that both the UK and US studies carried out interviews in 2000 and 2004 has made possible a comparative study of people of a similar age over the same period of time: 175 LSAL members aged 25–34 in 2000; 402 BCS70 cohort members aged 30 in 2000. To match as closely as possible the educational level of the LSAL population, the BCS70 sample was restricted to those with minimal or no qualifications (Level 1 or below) – most of whom had left school at the minimum age of 16 in 1986.

Both studies included:

- tests of literacy proficiency;
- measures of computer/internet access and use both at home and at work;
- time spent in employment – measured here as the number of weeks worked as a proportion of the 104 weeks available over the two years prior to interview;
- occupational status – measured from occupation of current job at the time of interview.

There was also a wide range of comparable demographic measures e.g. gender, parents' education, number of children and ethnicity. These were used as statistical controls, i.e. held constant, in the analyses.

Both groups were well matched in terms of certain demographic attributes, such as gender, mean years of parents' education and mean age of leaving school. Notably, during the four-year period, roughly 10% of LSAL and BCS70 achieved an educational qualification.

In other ways, the two populations were diverse.

- Among those in work in both locations, one-fifth were in skilled manual work, but twice as many of the London as in the Portland sample were in non-manual work (50%) and half as many were in unskilled manual work (28%).
- 45% of the London sample had yet to become parents, compared with just 30% in Portland.
- More than half of the London sample were homeowners compared with less than a quarter of the Portland sample.

THE LABOUR MARKET CONTEXT

Important contextual differences existed between the two locations. The Portland population had taken up, and maintained, high levels of ICT use by 2000 which had levelled off by 2004. In London ICT access and use was relatively low in 2000 but rose quite sharply between 2000 and 2004. Indeed, by 2004, there was convergence between the two countries.

Another distinctive feature of the Portland context was a recession in the local economy that caused fluctuation in the labour market. The proportion who had not worked in the year prior to interview increased from 24% in 2000 to 28% in 2004. However, in the same period there was a substantial increase in full-time workers. In such a climate the extent to which ICT and basic skills competence serves as a form of protection against redundancy, or enabled those made redundant to find other jobs, requires close examination.

In London the situation was quite different throughout the whole period. The economy was continuing to expand and employers were prepared to lower their recruitment standards in order to fill the places available. In such a situation ICT competence is at a premium in gaining access to better kinds of job, not jobs per se as in Portland.

DESCRIPTIVE TRENDS

The first stage of analysis was to compare changes in literacy proficiency and take-up of computer use and time spent in employment in the two countries over the four years between 2000 and 2004.

Literacy

In Portland there was little evidence of change between literacy test scores either for the overall sample or for men and women separately.

In the London sample a literacy test score was only available at age 34 so change could not be assessed. However, respondents were asked at both time points if they had basic skills difficulties. In 2000 12% reported having difficulties with reading, writing or number work; this reduced to 8% in 2004. Men were more likely than women to report difficulties in both 2000 (20% to 6%) and 2004 (13% to 3%).

Computer use

Figures 1a and 1b below show that while computer use at work rose steadily in Portland, computer ownership and use at home jumped dramatically in London from 43% in 2000 to 76% in 2004. Growth in computer use at home or at work levelled off and declined slightly in Portland. A little over 80% of both populations were using computers by 2004.

Employment

In conformity with labour-market trends, there was clear evidence of fuller and more sustained employment in the London sample between 2000 and 2004 compared to Portland (see Figure 2). Although about 20% of the workforce was out of the labour market in both locations at both times, a much higher proportion of workers in the London sample worked consistently every week at both time points – nearly 70% compared with just 10% in Portland in 2000. However, in 2004 38% of Portland area workers had been in consistent full-time employment.

The increase in full-time employment in Portland was coupled with a 90% increase in the proportion of jobs using computers by 2004. In 2000 64% of those with a job in Portland were using computers at work in 2004, compared with 48% in London.

Figure 1 Comparative BCS70 & LSAL digital divide indicators

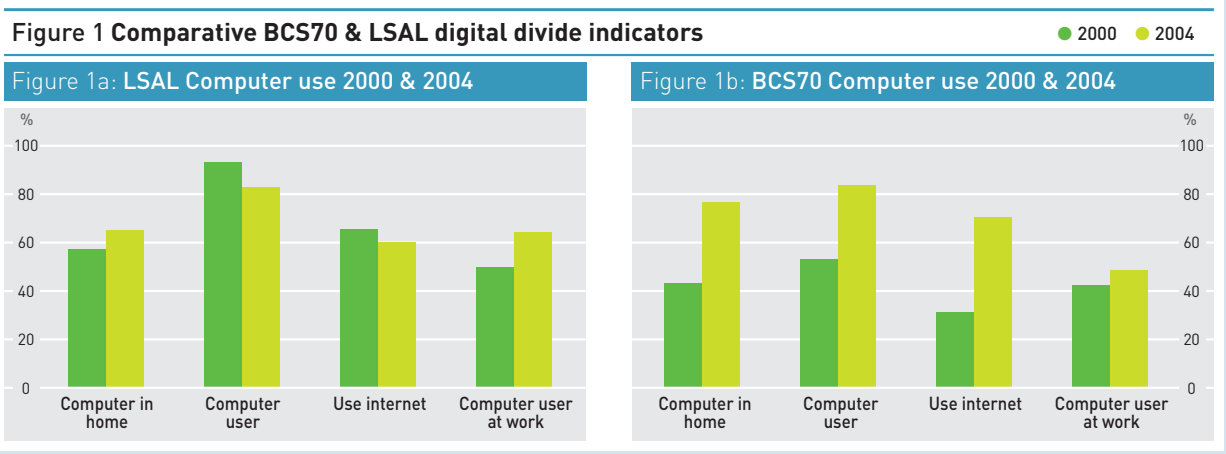
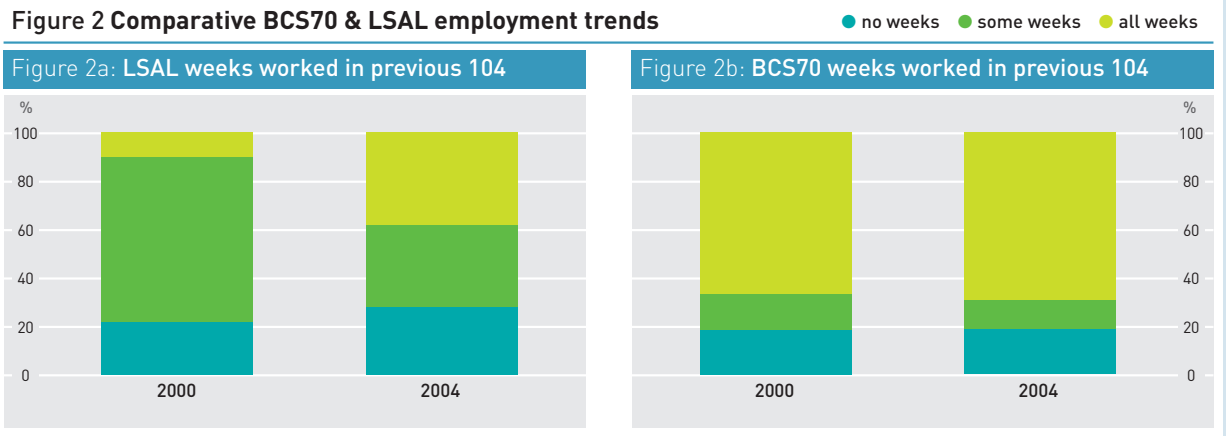


Figure 2 Comparative BCS70 & LSAL employment trends



THE THREE DIVIDES IN PORTLAND AND LONDON

Structural equation modelling (SEM) was used to investigate the extent to which literacy proficiency, computer use and time spent in employment are related to each other across time and hence can be considered to influence each other. Other socio-economic measures – gender, parents' education, number of children and ethnicity (the latter in the US only) – were also taken into account to serve as statistical controls.

The time sequencing of measures in such a model can be used to support causal interpretations of the relationships between the measures involved. For example, if literacy proficiency in 2000 is more likely to lead to increased computer use in 2004, rather than vice versa, then the strength of the relationship between literacy proficiency in 2000 and computer use in 2004 will be stronger than between computer use in 2000 and literacy proficiency in 2004.

The strength of the relationship between any two measures (e.g. literacy proficiency and employment) are estimated by statistically significant standardised regression coefficients which hold constant the effects of all other variables included in the SEM model. Such a regression coefficient has a range from +1 (strong positive relationship) to -1 (strong negative relationship).

The first step in the modelling strategy was to set out all the possible causal relationships between the three 'divide' variables. Estimating the strength of the relationships between the measures encompassed by the model was then carried out in three stages.

1. Portland model

In this we estimated the strength of the relationships between literacy proficiency, ICT competence and time spent in employment at both time points in Portland.

Findings

The model showed clear effects of time spent in employment and ICT use in 2000 on literacy proficiency in 2004, and a much more modest effect of ICT use in 2000 on employment in 2004. More specifically literacy proficiency showed no direct effect on employment or ICT use in 2004.

Interpretation

These results indicate that both exposure to ICT and employment experience probably boost literacy proficiency rather than the other way round. Extending the time spent on ICT at work to total time spent using ICT at home or at work produced stronger effects, suggesting that in the more depressed Portland labour market, all ICT experience, rather than just that gained at work, was likely to be helpful in getting a job.

2. Comparative model

We then estimated a reduced model with literacy proficiency only included in 2004 (age 34). This model does not estimate a change in literacy proficiency but enables comparison between Portland and London to be drawn.

Findings

Even without the measure of literacy in 2000, much the same pattern of relationships between the three divides was evident in Portland and London, but there were also differences. First, although the strength of the path between ICT use in 2000 and literacy proficiency in 2004 in the Portland model remained much the same, the path between employment in 2000 and literacy proficiency in 2004 strengthened to twice its original size. Secondly, in London there was also a strong effect of time spent in employment in 2000 on ICT use in 2004 not seen in Portland. Finally, in the London model there was no significant relationship between ICT use in 2000 and amount of employment in 2004.

Interpretation
In both Portland and London there appears to be a positive effect of employment and ICT use on subsequent literacy proficiency. In the Portland case, employment has a stronger effect than ICT and in the London case the reverse is true. Thus, the primary difference between the London and the Portland models appears to be in the effect of employment on literacy proficiency. In the Portland case, employment appeared to continue to strongly influence the development of literacy proficiency. In London the relationship between employment and literacy proficiency was much weaker.

3. Elaborated London model

The next step in the analysis was to elaborate the London model further, taking advantage of the larger sample size. Two extensions were evaluated: the first comprised testing the comparative model separately for men and women; the second comprised adding in another divide – occupational status – alongside the other three-divide measures of literacy proficiency, ICT use and time spent in employment.

Men and women separately

Findings
There were notable differences in the pattern of relationships within the men's and the women's models. For men, the strongest relationships were between ICT use in 2000 and literacy proficiency in 2004, and between amount of employment in 2000 and literacy proficiency in 2004. All the other relationships were relatively weak. For women, although the relationship between ICT use in 2000 and literacy proficiency in 2004 was replicated, it was accompanied by an effect of amount of employment in 2000 on ICT use in 2004.

Interpretation
For women, employment appears to provide a means of access to ICT, which in turn positively effects literacy proficiency over time. In contrast, for men there appeared to be little gain from employment in enhancing ICT competence that could then translate into enhanced literacy proficiency.

Effect of occupational status

Findings
Occupational status in 2000, as might be expected, predicted literacy proficiency, ICT use and the amount of time spent in employment in 2004. However, in this case the effects were two-way (reciprocal), with the rise in ICT use and amount of employment in 2000 also predicting rise in occupational status in 2004.

Interpretation
The two-way reciprocal effects between the three divide measures were stronger for women than for men. This may be because the return to work after child rearing can involve moving up a gear in all areas of competence in order to catch up. In contrast, for men, use of ICT appears to be more about occupational progress than getting back into the labour market per se. For both men and women, ICT use in 2000 continues to predict increased literacy proficiency in 2004. ICT in 2000 also predicts occupational status in 2004, as does time spent in employment.

Accordingly, we reinforce our conclusion that the relationships between ICT and time spent in employment across time are different for men and women. In the case of men, computer use connects with higher status occupations, which themselves probably support literacy proficiency improvement. For women, many of whom are returning to the labour market after child rearing, the key route to literacy proficiency is through employment which gives access to computer use. Computer use then provides the means of raising literacy proficiency levels.

POLICY CHALLENGES

- The different labour market conditions in Portland and London place a premium on ICT use at home or in the workplace. In Portland ICT competence appears to improve the chances of getting employment and retaining it. Whereas in London there is little evidence of such direct benefits to employability from gaining ICT competence; jobs were abundant during 2000–2004 and any additionally required skills were learned 'on the job'.

- The digital divide is reducing more quickly in Portland than in London but a solid minority in both countries still have little access to or use of ICT. This points to a degree of marginalisation in the workforce of those without digital skills, which is likely to be particularly evident at times of economic stress. At such times (as in Portland) those with good digital skills will be less likely to lose their jobs than those without those skills.

- Employment and ICT use support the development of literacy proficiency. Hence, enhancement of literacy proficiency is aided substantially by time spent in employment and exposure to ICT. There is less evidence of effects in the other direction i.e. of improved literacy proficiency influencing the take-up of ICT or the likelihood of getting employment.

- From the London evidence it appears that ICT use is tied to progression in employment for men. For women it is more closely aligned with engagement with the labour market.

More generally we can conclude that absence of, decline or stagnation in any of the competences reflected in the three divides increases the likelihood of marginalisation and exclusion. This reinforces the case for continuing and expanding adult basic education provision. The need to enhance and continually update digital competence takes particular priority. At a time of economic downturn such competence becomes a 'key skill' in re-engaging with the labour market and maintaining a secure position in it when the economy improves. However, digital skills cannot sensibly be seen in isolation from the other foundations of employability in which literacy proficiency, and increasingly numeracy proficiency, have a central place. Employment itself is of course the other major bastion of protection as it supplies not only the means of gaining skills but the opportunity to practice, fine tune and develop those skills.

CONCLUSIONS

This study has shown the existence of 'virtuous' circles where enhanced skills work in tandem with employment experience to reinforce prospects further. The 'vicious' side of the circle is also evident from our findings. Lack of ICT access and use coupled with consistently poor literacy is likely to damage employability further. The consequence is more, rather than less, marginalisation in the labour market. The need then becomes to improve and update continually adult educational provision so that it keeps up with modern employment demands.

It appears that boosting literacy proficiency is unlikely to be sufficient to reverse labour market exclusion processes on its own. A combination of literacy provision that raises ICT competence alongside the creation of employment opportunities is more likely to convert the vicious circle into a virtuous one.

About the authors

John Bynner, Emeritus Professor of Social Sciences, NRDC, Institute of Education, University of London
Steve Reder, Professor and Chair, Department of Applied Linguistics, Portland State University
Samantha Parsons, Senior Research Officer, Institute of Education, University of London,
Clare Strawn, Assistant Professor, Portland State University

The full research report on which this paper is based can be found at www.nrdc.org.uk

www.nrdc.org.uk

NRDC
Institute of Education
20 Bedford Way
London WC1H 0AL
Telephone: 020 7612 6476
email: publications@nrdc.org.uk

NRDC is a consortium of partners led by the Institute of Education, University of London. It includes:
- Lancaster University
- University of Nottingham
- University of Sheffield
- National Institute of Adult Continuing Education
- Learning and Skills Network
- LLU+, London South Bank University
- King's College London

Leading education and social research
Institute of Education
University of London