National Research and Development Centre
for adult literacy and numeracy

The digital divide: numeracy proficiency, employment and computer use

Research report

Prepared for NIACE by the National Research and Development Centre for Adult Literacy and Numeracy (NRDC) at the Institute of Education (IOE), University of London

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Executive summary

I. The purpose of this report is to investigate the relationship between numeracy, employment and ICT. It was undertaken by the National Research and Development Centre for Adult Literacy and Numeracy (NRDC) as part of a suite of studies on numeracy commissioned by the National Institute for Adult and Continuing Education (NIACE).

II. This study builds on a earlier work by Bynner et al (2008) for the NRDC which analysed data from London and from Portland, Oregon to investigate three divides between “haves” and “have nots” in relation to literacy, employment and digital skills. The current study investigates the three divides of numeracy, employment and computer use as evidenced in longitudinal data from the 1970 British Cohort Study (BCS70) to develop understanding of the relationships between these divides.

III. Analysis was performed on data on 8,910 individuals from two sweeps of BCS70, gathered in 2000 and 2004. The variables of interest in this study were: individual scores from a numeracy assessment undertaken by cohort members at the age of 34; amount of time spent in employment; and combined computer usage at work and in the home. Analysis was carried out using structural equation modelling (SEM) to estimate the strength of the relationships among the three divides at each time point (that is, 2000 and 2004) and between these two time points.

IV. On average, men in the BCS70 sample had higher numeracy skills than women in the sample. Individuals in employment had higher numeracy skills that those who were not employed and sample members whose numeracy skills were poorer were much more likely to have spent some time out of employment in the 24 months before interview than those with higher skills. Those with higher levels of numeracy were more likely to have access to a computer, and to be computer and internet users.

V. Results of the SEM indicate that more time spent in employment and, even more strongly, greater ICT use, boost numeracy proficiency, rather than the other way round. The positive effect on numeracy proficiency of ICT use in the home is weaker than the positive effect of ICT use at work, which suggests that it is specifically the use of ICT in the workplace that drives the relationship and produces better employment outcomes and higher numeracy proficiency for individuals.

VI. Moving from the results of basic modelling to more elaborate modelling, analysis of the concurrent and time variant relationships suggests that for men, time spent in employment is significant for their numeracy development. For women, the relationship of significance is that between time spent in employment and computer use, and therefore by implication, ICT skills.

VII. Substituting the variable for time spent in employment with a variable for occupational status tends to produces stronger relationships. This suggests that numeracy and ICT skills are more important for upward mobility within the labour market than entry to the labour market. By implication workplace training in numeracy and ICT could increase occupational mobility.

VIII. For those with low qualifications, being in work is significant both in improving numeracy and leading to more frequent ICT use and thus potentially to an increase their digital competency. For women, and those with low qualifications, ICT use and numeracy skills developed outside labour market, at home or in classes, could boost employment prospects.

IX. The findings from the study suggest that that boosting numeracy proficiency and ICT access and use is unlikely to be sufficient to erase divides between the "haves" and "have nots" and decrease labour market marginalisation processes. A combination of provision that raises digital and numeracy competences and opportunities for employment where those skills can be practiced is required.

1. Introduction

The analysis in this report builds on an earlier study by Bynner et al (2008) for the National Research and Development Centre for Adult Literacy and Numeracy (NRDC). The context of the original study, published as *The Digital Divide: computer use, basic skills and employment*, was the rising importance of the use of and access to computers as part of contemporary employability. Bynner et al looked at the relationship between literacy, employment and ICT, and suggested that not only could digital skills, along with literacy, act as a barrier to entry to the workplace, but also time spent in employment and exposure to ICT supported the development of literacy proficiency. So, those in employment were likely to improve their ICT and literacy skills, while those outside the workforce were likely to see their skills stagnate or decline.

This set of circumstances had the potential to set up the "digital divide" of the report's title: the three divides between the "haves" and the "have nots", in relation to literacy, employment and digital skills. The current study reanalyses the same data and asks whether similar conclusions can be drawn about three divides in relation to (i) numeracy, (ii) employment and (iii) ICT usage.

(i) Previous NRDC work has highlighted the impact of poor numeracy skills on life chances: individuals with poor numeracy earn less and are much more likely to be unemployed than those with good numeracy, and adults with poor numeracy tend to have worse health and are less likely to be socially engaged than those with good numeracy (Bynner & Parsons, 2006; Parsons & Bynner, 2007). The extent of the numeracy problem is evident from the 2011 Skills for Life Survey (BIS, 2012), which found that a quarter (24%) of respondents – the equivalent of one in every four adults in England, or 8.1 million people – performed below Entry level 3 on the numeracy assessment, the level considered the minimum required to function effectively in modern society (Leitch, 2006).

(ii) The employment divide reflects the marginalised opportunities that accrue to those who experience regular spells of unemployment at one end of the labour market, as opposed to those in full-time, continuous and progressive careers at the other.

(iii) There are links between digital competence and a variety of socio-demographic characteristics, among them: income, education, ethnicity, gender, and geographic location (urban-rural), age, other skills, cultural and psychological attitudes (Wensheng, 2001; Wilson, 2004; Menzie & Fairlie, 2004; Guillen & Suarez, 2005; Mossberger et al, 2006; Carr, 2007; Galperin, 2010; Hilbert, 2009; 2011). International research has identified income levels and educational attainment as providing the most powerful explanation for ICT access and usage (Hilbert, 2009). Data from the British

Cohort Study show that, when compared to 34-year-old men and women with good numeracy skills, those with poor numeracy skills are twice as likely to lack internet access and more than twice as likely not to use a computer, even when there is one in the home (Parsons & Bynner, 2007).

The digital divide sets apart those who are fully competent in the use of ICT from those who lack these skills or have no access to them through the use of computers and the internet either at home or their place of work. Moreover, lack of access to or competence in digital skills is increasingly an obstacle to taking advantage of the learning and training opportunities that computers and the internet provide.

There is evidence, then, for the existence of these three divides between "haves" and "have nots", as poor numeracy, a lack of ICT skills and time out of the labour market are all associated with decreased life chances. However, there is little understanding of the relationship between these three divides. This report is designed to address that gap.

2. Methodology

2.1 Data and sample

As in Bynner et al (2008), this study analyses data from the British Cohort Study (BCS70), a birth cohort study which follows the lives of more than 17,000 individuals born in England, Scotland and Wales in a single week in April, 1970. Data were collected when cohort members were born, and follow-up interviews were conducted at ages 5, 10, 16, 26, 30, 34, 38 and, most recently, 42. Coverage includes key indicators of circumstances and experience relevant to life stage and ranges widely over family life, education, health and citizenship. A comprehensive basic skills assessment was taken by all cohort members at age 34.

For this study, researchers made use of data from the 2000 and 2004 sweeps of BCS70 (members at ages 30 and 34). Since the aim was to study the relationships between the three divides (numeracy, employment and computer use), the sample was restricted to those cohort members for whom valid data were available for the numeracy assessment in 2004 and for employment history in the 24 months prior to the 2000 and the 2004 interviews. The final sample for analysis included 8,910 individuals.

There are two significant differences to the 2008 study. First, the earlier analysis was based on a part-sample of BCS70 in that it included only cohort members living in Greater London and the urban parts of the south east England: the current study covers the whole of Great Britain. Secondly, Bynner et al compared their findings for the London study to data from Portland, Oregon gathered as part of the Longitudinal Study of Adult Learning. This comparative element has not been replicated here. Although working with a much larger sample from BCS70 is beneficial in that it increases the robustness of the findings and gives more flexibility to the model building, the differences between the two studies limit any direct comparisons.

2.1 Measure of numeracy proficiency

The numeracy assessment instrument used with BCS70 members in 2004 combined open-response, paper-based questions previously used to assess the functional numeracy skills of cohort members at age 21 with multiple-choice computer-based questions extracted from the 2002-3 Skills for Life Survey (SFL2003). To obtain as balanced a set of questions as possible in relation to curriculum coverage and difficulty levels, the final instrument was made up of five questions set at Entry Level 2, four at Entry Level 3, five at Level 1 and three at Level 2 (17 in total).

This study uses the 17 questions in the computer-based assessment as the main measure of numeracy. Seven aspects of number skill from the numeracy curriculum were assessed: Basic Money (BM); Whole Numbers and Time (NT); Measures and Proportion (MP); Weights and Scales (WS); Length and Scaling (LS); Charts and Data (CD), and Money Calculations (MC). The questions were presented in order of difficulty within each curriculum topic.

For numeracy, computation of an overall score was straightforward as all cohort members completed all questions. Any correct answer was given "1" point, any incorrect answer "0" points. The maximum numeracy score available from the multiple-choice questions is therefore within the range 0 to 17 for all cohort members.

For detailed discussion of the instrument used see Parsons (2012).

2.2 Measure of employment and occupational status

Each sweep of data collection in BCS70 collects information on cohort members' current employment status (e.g. full-time education, unemployment, full- and part-time employment) together with a complete economic activity history stretching back to the date of last interview. From these data, researchers can work out how long, in any given period, a cohort member has spent in each employment status from the time they were aged 16.

For this study, the main variable in the model is the amount of time spent in employment. This is calculated as the proportion of months employed (including maternity leave) over the two years (24 months) prior to the 2000 and 2004 survey interview dates.

In elaborated models, occupational status is used instead of time spent in employment in order that occupational mobility and its relationship with computer use and numeracy proficiency can be investigated. Type of occupation is derived from the main job held at time of interview in 2000 and 2004, coded in terms of the nine major groups of occupations specified in the UK Registrar General's Standard Occupational Classification (1990) for both 2000 and 2004[1].

[1] The Standard Occupational Classification (SOC90) was introduced in the United Kingdom in 1990 as the first single classification of occupations. It was subsequently adopted by most government departments and agencies responsible for the production of occupationally classified information or the processing of occupational data. SOC90 is explicitly hierarchical in structure, grouping jobs according to the kind of work and the nature of the operation performed. It is comprised of unit groups at the most detailed level, which make up minor groups and (nine) major groups respectively. The major group structure brings together occupations which are similar in terms of the qualifications, training, skill and experience. SOC2000 and then NS-SEC has since replaced SOC90, but in this report we concentrate on SOC90.

2.3 Measure of computer use

In both 2000 and 2004 cohort members were asked if they had a computer in their home and, if so, how often they usually used this computer, with answers recorded on a 5-point scale ranging from "never" to "daily". Those who used computers were asked about the ICT activities they used their computer for, including word processing, spreadsheets, downloading music, playing games, internet etc. In 2004 a more comprehensive list of internet activities (e.g. shopping, paying bills, personal interests) was included. Both survey waves also asked employed cohort members whether they used a computer at work and if so, how often, on a scale ranging from "less than once a week" to "daily". Computer users were asked what activities they used their computer for, including word processing, spreadsheets and the internet.

For the purposes of this study the main variable of interest is combined computer use both at home and work. This variable is created by summing two scales for computer use at home and work, each ranging from 0 ("do not have a computer and/or never use it") to 4 ("daily use"). This allows the inclusion in the models of individuals who were not in employment at the time of interview and did not respond to the questions about computer use at work. The summative variable representing "use of computer" ranges from 0 to 8, with higher values representing more frequent computer use.

Although the ICT skills of cohort members were not assessed, findings presented here make the assumption that the more an individual uses a computer, the better their skills are; computer use therefore functions as a proxy for ICT competence.

2.4 Analytical strategy

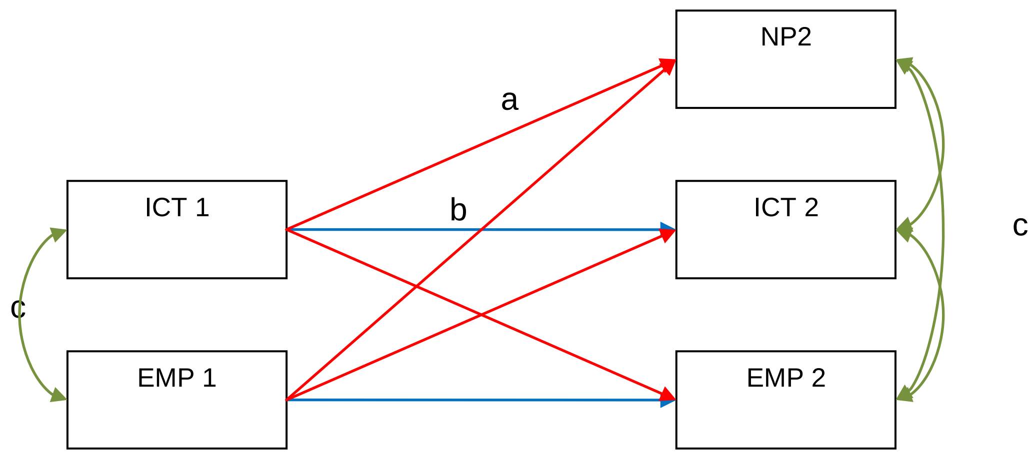
The main aim of this study is to model changes in numeracy proficiency, employment and ICT use to determine how changes in one are related to changes in the others. This is done by using structural equation modelling (SEM), a process which involves estimating the strength of the relationships among the three divides at each time point (that is, 2000 and 2004) and between these two time points. A number of control variables which might confound these relationships are also included in models, to explore, for example, how strong the relationship between ICT use and numeracy proficiency is when an individual's gender, highest qualification and number of children are taken into account.

Figure 1 below shows the basic model:

- the boxes on the left show the measures for ICT use (ICT) and employment (EMP) in 2000 (Time 1);

- the boxes on the right show measures for the same two variables and also numeracy proficiency (NP) in 2004 (Time 2).

Figure 1: Two time points, three variables, cross-lagged structural equation model



The model contains a number of lines joining the variables. These lines or "paths" are the main focus of the analysis that follows.

Of prime interest are the diagonal lines (**a**), which cross from one variable to another across time. These cross-lagged relationships indicate the strength of the relationships between ICT, employment and numeracy, allowing us to describe the **direction of influence**. If the estimated strength of the relationship (the coefficient) for a pair of variables is stronger for one cross-lagged path than another, we can infer that this reflects the stronger influence or effect. For example, if the path from employment in 2000 to ICT use in 2004 is stronger than the path from employment in 2000 to numeracy proficiency in 2004 then it can be inferred that employment has a stronger influence on the development of ICT skills than it does on numeracy.

The straight lines (**b**) show the relationships between ICT and employment across time (2000 to 2004). These autoregressive paths link the repeated measures of the same variable across time indicating the extent to which sample members changed over time. These paths can be used to see whether an individual's ICT use or their employment status changed between 2000 and 2004. This allows researchers to assess **the stability of the measure over time**.

The curved lines (**c**) represent correlations between the variables. These indicate **the strength of the relationship between the three divide variables (ICT, EMP, NP) at each time point**. With these relationships it is not possible to assign causality – ICT use may, or may not, influence employment and vice versa. All the correlation can tell researchers is that they are related and what the strength of that relationship is.

To make a causal claim about the relationships between the variables, the model is adapted to a longitudinal context. In particular, as shown in Figure 1, this study focuses on the degree to which the predictors at Time 1 could account for change (rather than concurrent status) in the variables at Time 2. This is accomplished by examining hypothesized cross-lagged paths among the variables (e.g., the path from computer use at Time 1 to numeracy proficiency at Time 2), while controlling for the autoregressive paths (e.g., the relation of computer use at Time 1 with computer use at Time 2). As mentioned above, this model still allows for investigation of the concurrent relationships when looking at the stability of measures across time (c).

In addition to the core measures (ICT, EMP, NP), in the structural equation model, various control variables are included, that is gender, highest qualification at age 30, and number of dependent children[2]. The model estimates for these are shown, together with all the other model estimates, in Appendix A.

Two types of model can be evaluated: a **fully saturated** model in which a maximum number of plausible paths are estimated, and a **constrained** model in which some of these paths are assumed to have no influence and so are fixed at 0. In the latter case the fit of the model is then tested using a number of goodness of fit indices that help to determine whether the model represents empirical data.[3]

After the initial analysis of the BCS70 data using the basic model (Figure 1), various hypotheses were examined in expanded models:

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[2] In 2000, the variables are assumed to be exogenous or fixed, i.e. unaffected by any changes in the (endogenous) variables to the right of them in the model and the correlations between them are the same as in the raw data on which the modelling is based. The correlations in 2004 are estimates derived from the model itself. The strengths of all the other paths in the model (cross-lagged or controls) are estimated as partial regression coefficients. For convenience of interpretation these path coefficients are usually standardised to have the same range as a correlation coefficient: -1 to +1.

[3] The fit of the model is tested against the observed data and evaluated using a number of goodness of fit indices that help to determine how well the covariance structure among variables implied by the model is reproduced in the observed data. The coefficients estimated by the model can then be appraised for statistical significance, i.e., whether a non-zero path strength estimate is unlikely to have occurred by chance at a given probability level.

- The model was tested separately for men and women to demonstrate the relationship of **gender** to the three divides.
- Time spent in **employment** was replaced with **occupational status** (SOC) to explore, for example, whether there is a particular premium, in terms of career progression, attached to numeracy proficiency and to compare any premium to that attached to ICT.
- The third model combined **gender and occupational status** to explore if the relationships among numeracy skills, ICT use and occupational status are different for men and women.
- The fourth model explored the relationships between the three divides among individuals with low and high **educational attainment,** measured as their highest qualification achieved.
- Finally, individuals with low and high **educational attainment** were separated and in this model time spent in employment was replaced with **occupational status** (SOC).

Full details of the results for all models are given in Appendix A.

3. Data description: the three divides

3.1 Numeracy

3.1.1 Numeracy level

As no numeracy tests were carried out on cohort members at age 30, the variable on numeracy level can be introduced into the models only at Time 2. Table 1 shows the numeracy skills of the BSC70 members, measured by the five lowest levels of the National Qualifications Framework (NQF). Almost 15% of individuals have skills below the threshold target for functional numeracy of Entry level 3; a further 25% have skills at Entry level 3.

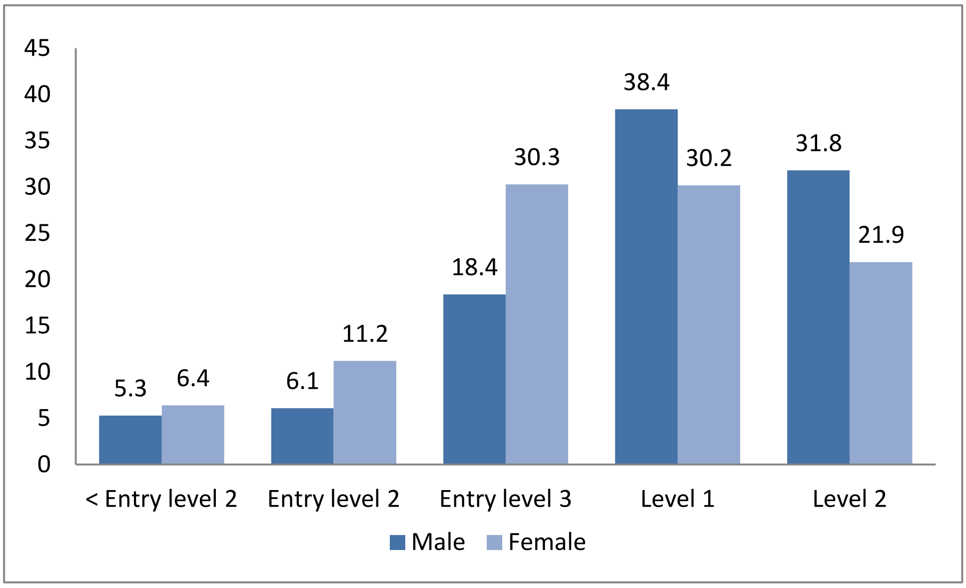
Table 1: Distribution of numeracy skills as assessed by level in 2004

	N	%
< Entry level 2	523	6
Entry level 2	785	9
Entry level 3	2202	25
Level 1	3035	34
Level 2	2365	26
Total	8910	100

3.1.2 Numeracy level and gender

Figure 2 compares the numeracy skills of men and women in the cohort and shows that on average men have higher levels of numeracy proficiency: for example, 18% of women but only 11% of men have their numeracy assessed at Entry level 2 or below.

Figure 2: Distribution of numeracy levels by gender (% of sample)



Differences statistically significant, chi-square test p=.000, N=8,910

3.1.3 Numeracy level and educational attainment

Table 2 shows the relationships between educational attainment (highest qualification achieved) and numeracy proficiency. As expected, although numeracy skills vary within educational groups, individuals with higher educational qualifications also have better numeracy skills. For example, only 1.3% of individuals with a highest qualification at Level 5 of the National Vocational Qualifications (NVQ) have numeracy at NQF Entry level 2 or below, whereas among those with no educational qualifications, this proportion is 17.2%.

Table 2: Distribution of numeracy levels by highest qualification achieved in 2004

	Highest qualification achieved in 2004					
Numeracy	**none**	**NVQ Level 1**	**NVQ Level 2**	**NVQ Level 3**	**NVQ Level 4**	**NVQ Level 5**
< Entry level 2	17.2	10.6	6.5	4.1	2.6	1.3
Entry level 2	16.0	15.1	11.9	7.4	4.4	2.0
Entry level 3	36.5	36.5	31.3	20.7	17.4	8.7
Level 1	21.6	25.7	29.9	41.0	39.8	36.8
Level 2	8.8	12.0	20.5	26.9	35.7	51.3

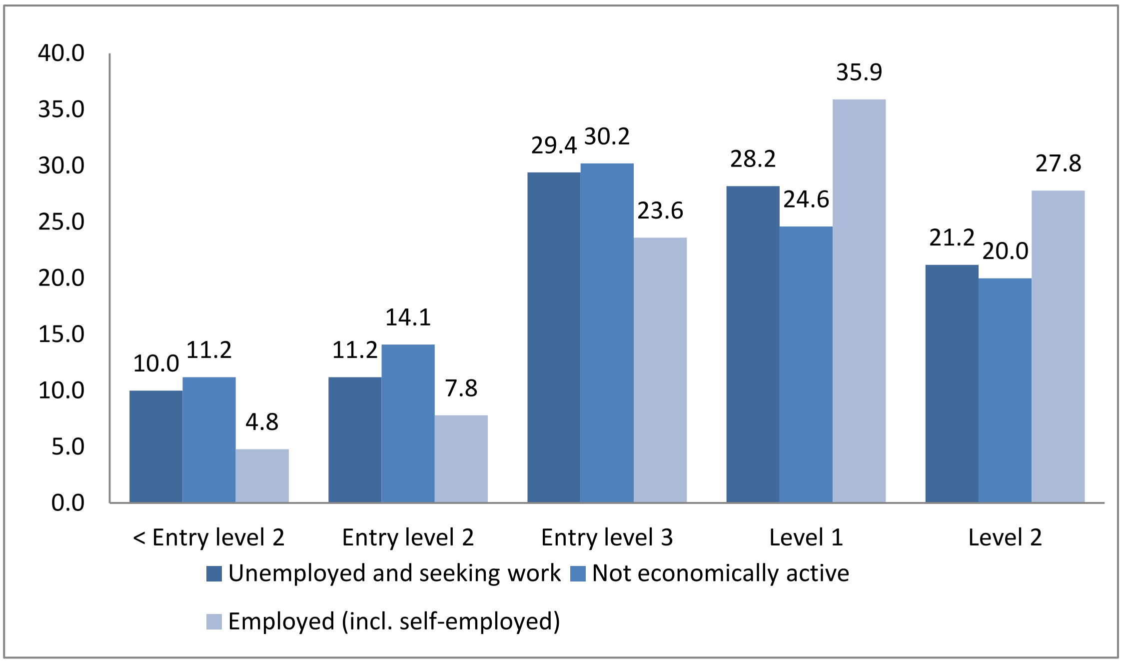
Differences statistically significant, chi-square test p=.000, N=8,910

Interestingly, among those with low or no qualifications there is significant variation in the numeracy assessment results suggesting that while general educational attainment (in terms of qualifications gained) and numeracy skills are related they do not overlap completely; an individual with no qualifications may still have reasonable, or even very good, numeracy skills.

3.1.4 Numeracy level and employment

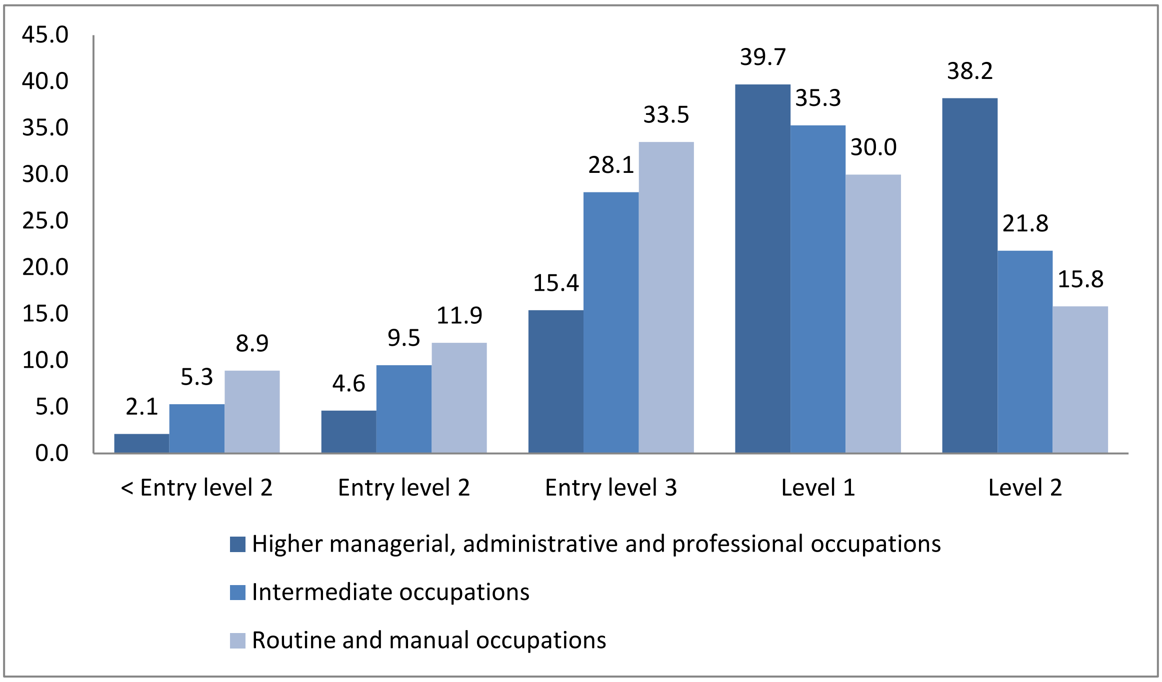
Figure 3 shows that individuals in the workforce have better numeracy skills than those who are not.

Figure 3: Distribution of numeracy levels by economic status (% of sample)



Socio-economic status is also associated with numeracy proficiency. Figure 4 shows that only 2.1% of those in the highest occupational category have numeracy skills below Entry level 2 compared to nearly 9% in the lowest occupational category. The relationship holds for NQF Entry levels 2 and 3; at Levels 1 and 2 the reverse is true, with more of the sample in higher managerial and professional occupations.

Figure 4: Distribution of numeracy levels by socio-economic classification status (NS-SEC 3 analytic version) those employed in 2004



3.2 Employment

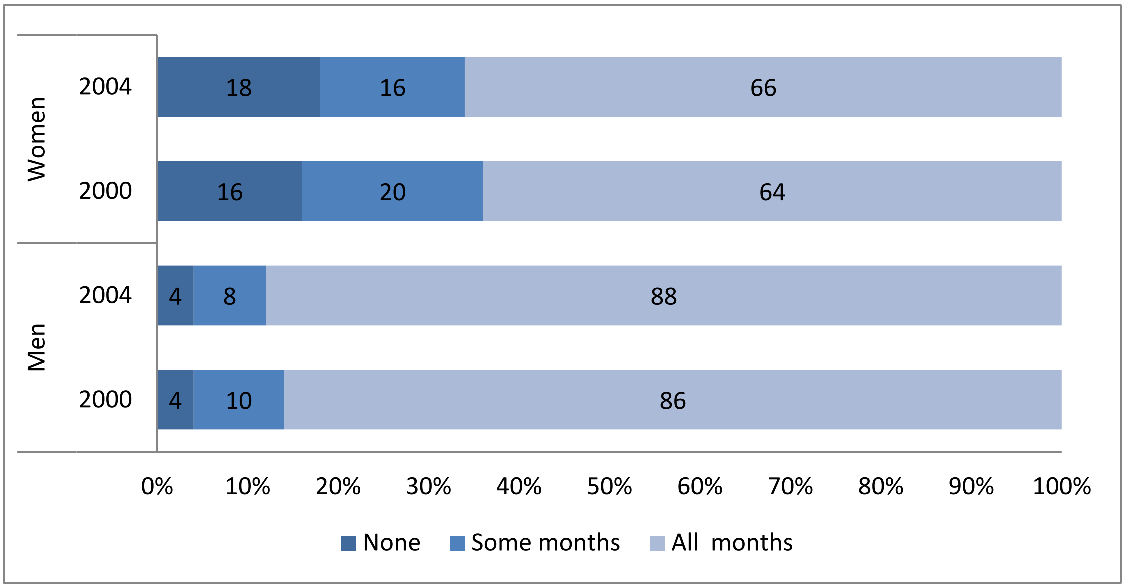
3.2.1 Employment and socioeconomic status

Similar proportions of the overall BCS70 sample (i) worked continuously and (ii) did not work at all in the 24 months prior to interview in 2000 (75% and 10%) and 2004 (77% and 11%) (see Table 3). On average cohort members worked 20 months out of 24 in both reference periods. As Figure 5 illustrates men are more likely to have longer spells of employment compared to women in both 2000 and 2004. This difference is stable over time with close to 90% of men being employed for all 24 months compared to an average of 65% of women.

Table 3: Employment trends 2000 and 2004

Item	N	Mean values and % 2000	Mean values and % 2004
Worked all 24 months prior to interview	8910	75%	77%
Did not work all 24 months prior to interview	8910	10%	11%
Number of months worked (incl. maternity leave) in 24 months prior to interview	8910	20.1	20.1
Number of months worked (incl. maternity leave) in 24 months prior to interview (if worked at all)	8910	22.4	22.6
Months spent on these activities in 24 months before interview:			
• **in employment**	8910	20.1	20.1
• **unemployed**	8910	0.5	0.8
• **maternity leave**	8910	0.0	0.4
• **training/education**	8910	0.4	0.6
• **sick or disabled**	8910	0.4	0.9
• **looking after home/family**	8910	2.4	2.9
• **other activities**	8910	0.1	0.5

Figure 5: Employment trends 2000 and 2004, by gender



3.2.2 Employment and numeracy

The relationships between time in employment and numeracy levels, and time in employment and highest general qualification, are very similar (Figure 6 and 7). Those with low numeracy skills are much more likely to be out of employment for the entire 24 month period prior to interview and to experience shorter spells of employment, and so are those with no educational qualifications. The difference by numeracy levels and by general qualifications is quite stable over time; most groups across all educational levels experienced a small but positive change in the proportion employed continuously in the two years prior to interview in 2000 and in 2004.

Figure 6: Employment trends 2000 and 2004, by numeracy level

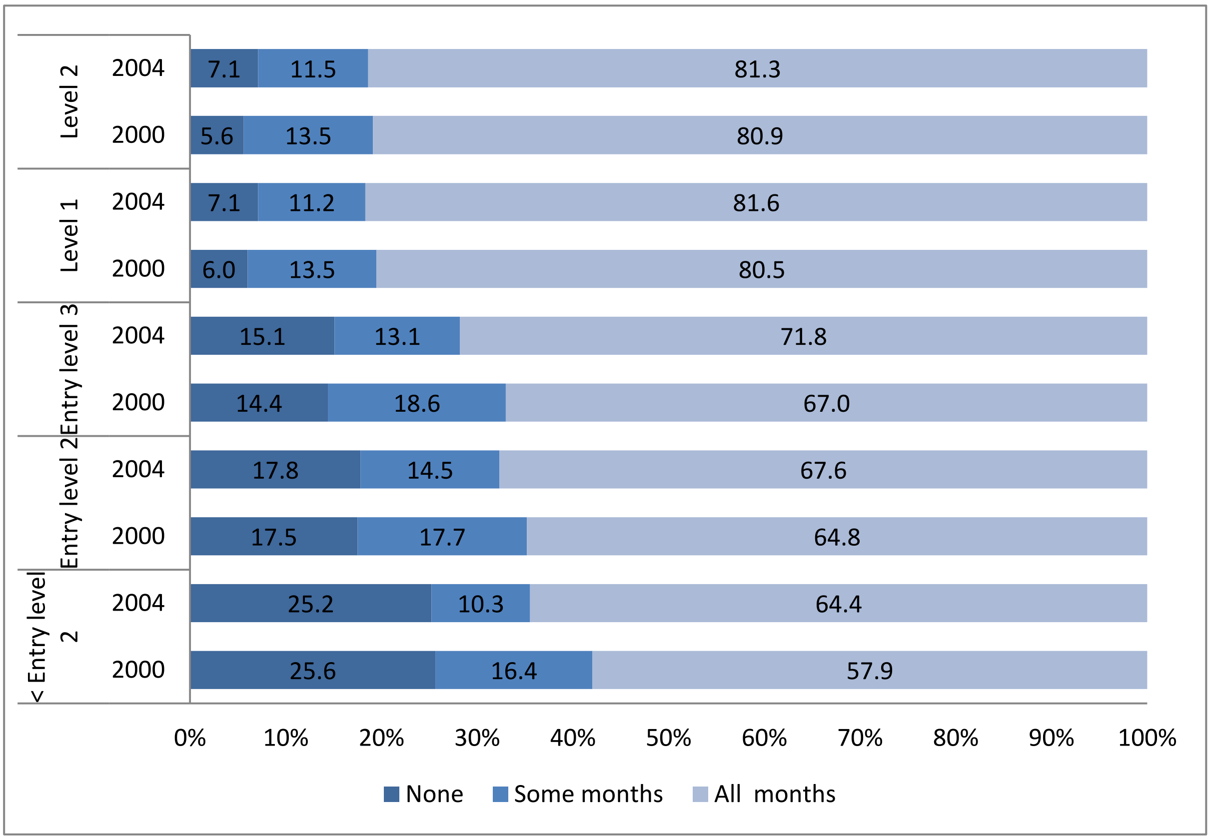
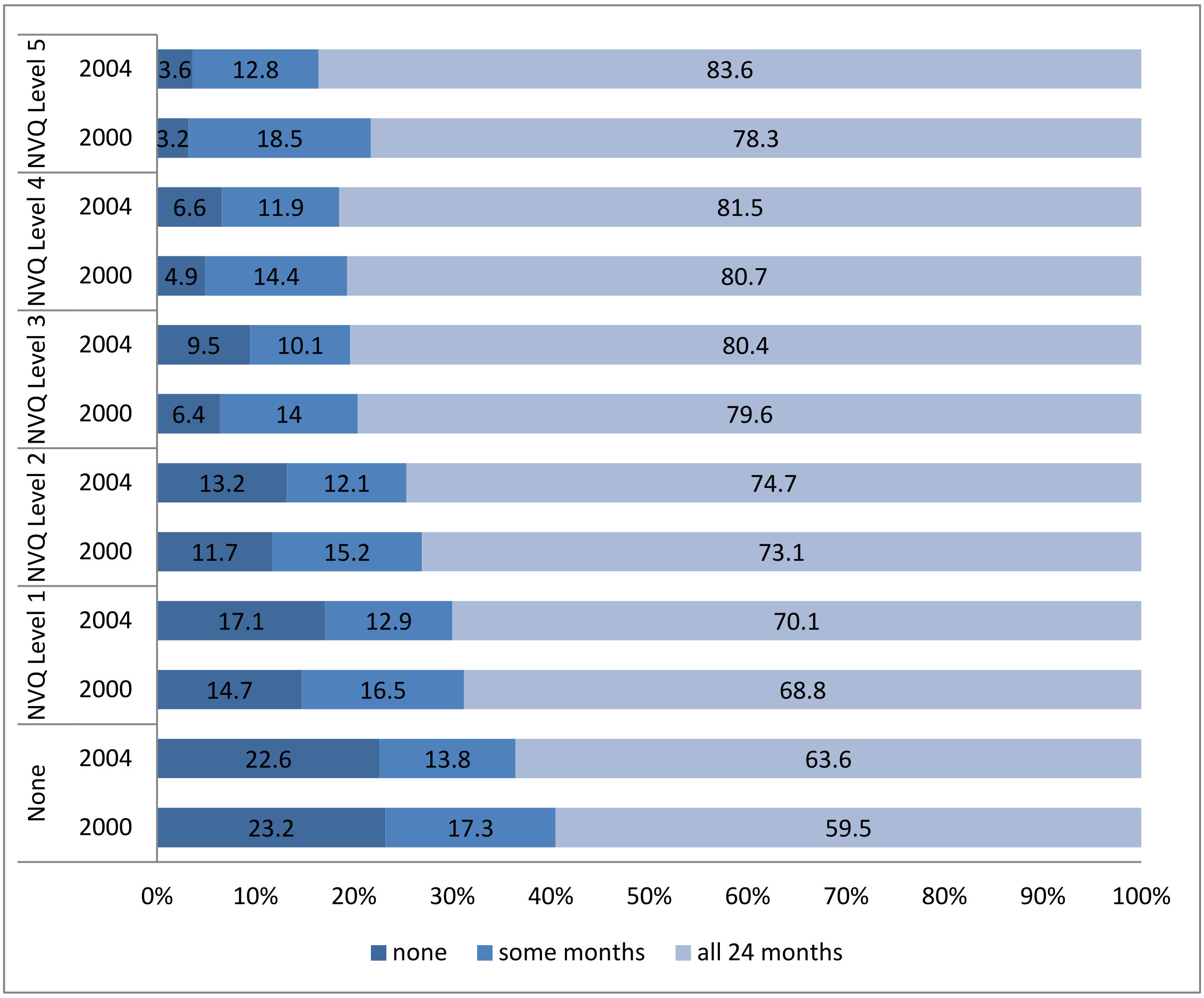


Figure 7: Employment trends 2000 and 2004, by highest qualification



3.3 Computer and internet use

In 2000, 51% of BCS70 cohort members had a computer at home, but only 45% of them used it at least once a week or more, and a further 15% used it daily (see Table 4). By 2004, 82% of cohort members had a computer at home and 26% used it daily. The period from 2000 to 2004 saw a huge increase in internet use and this is reflected in the BCS70 data, with a three figure increase (174%) in those using the internet at home in 2004 as compared with 2000.

Only cohort members in employment were asked about computer use at work. There was a slight increase (11%) from 2000 to 2004 in those using a computer at work once a week or more and a similar increase in those who used the computer daily at work (12%). The proportion of the sample using the internet at work rose far more steeply (79%).

Table 4: Computer and internet use in 2000 and 2004

Item	N	Mean values and % 2000	Mean values and % 2004	% change
Computer in home	8907	51%	82%	61%
Computer user at home (uses once a week or more)	8899	45%	54%	20%
Daily use at home	8899	15%	26%	73%
Word processing at home	8901	35%	60%	71%
Use internet at home	8901	31%	85%	174%
Computer user at work (uses once a week or more)**	6707	66%	73%	11%
Daily use at work**	6707	58%	65%	12%
Word processing at work**	4976	64%	79%	23%
Use internet at work **	4976	38%	68%	79%

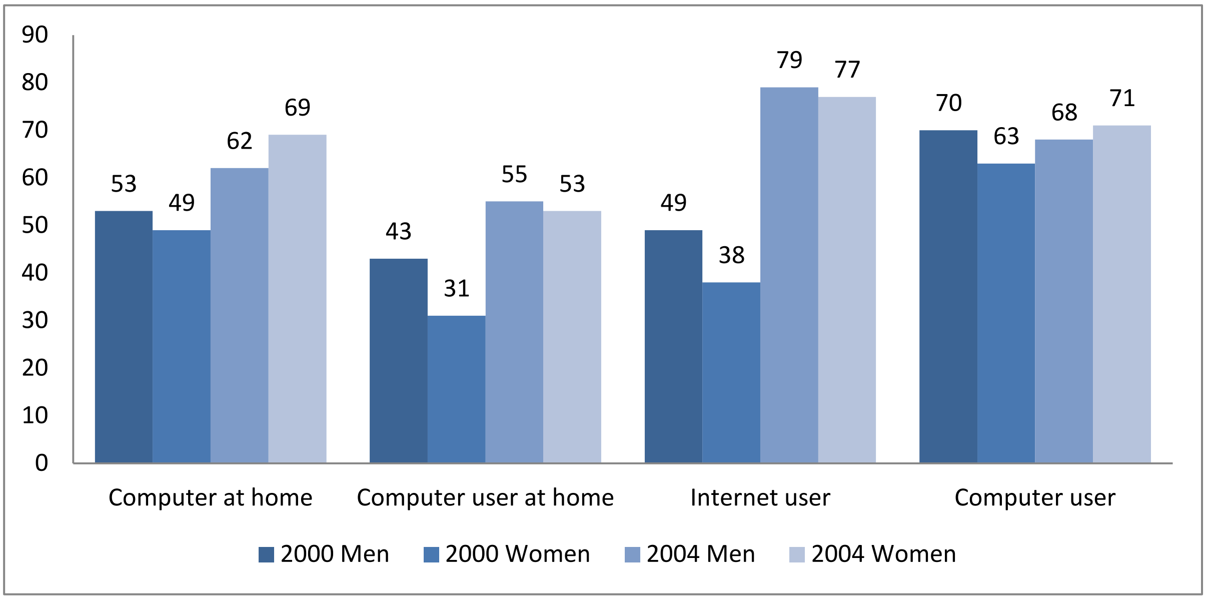
** Only sample members employed at both time points are included in analysis

However, by combining computer use at home and computer use at work, the percentage increase in those who used computers between 2000 and 2004 falls to just 3%[4]. This suggests that rather than more people beginning to use computers for the first time, much of the change happened in the form of the diversification of computer use areas and intensification of use. The use of word processing (18%) and the internet (81%) both increased markedly, which is consistent with technological changes in the workplace at this time.

Turning to gender, Figure 8 shows that in 2000 women were less likely to have and use a computer at home or to be internet users. However, in 2004 slightly more women than men had a computer at home and a very similar proportion of men and women were computer and internet users.

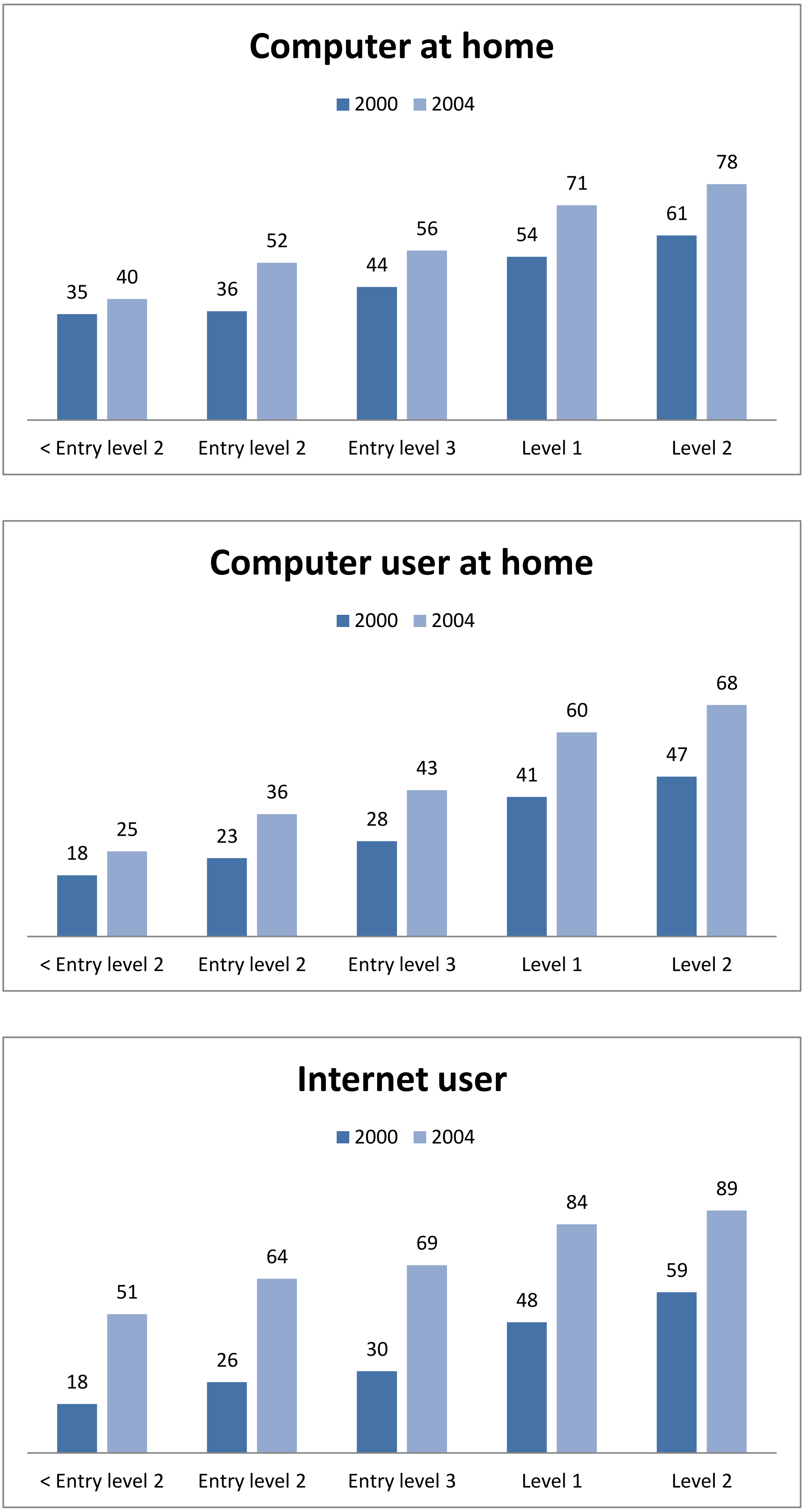
[4] Many of those who did not use a computer at work or were not in employment at the time of the first interview did use a computer at home. Accordingly, the change over the four years is smaller than may be expected because many of those who began to use computers at work between 2000 and 2004 already used a computer at home and vice versa.

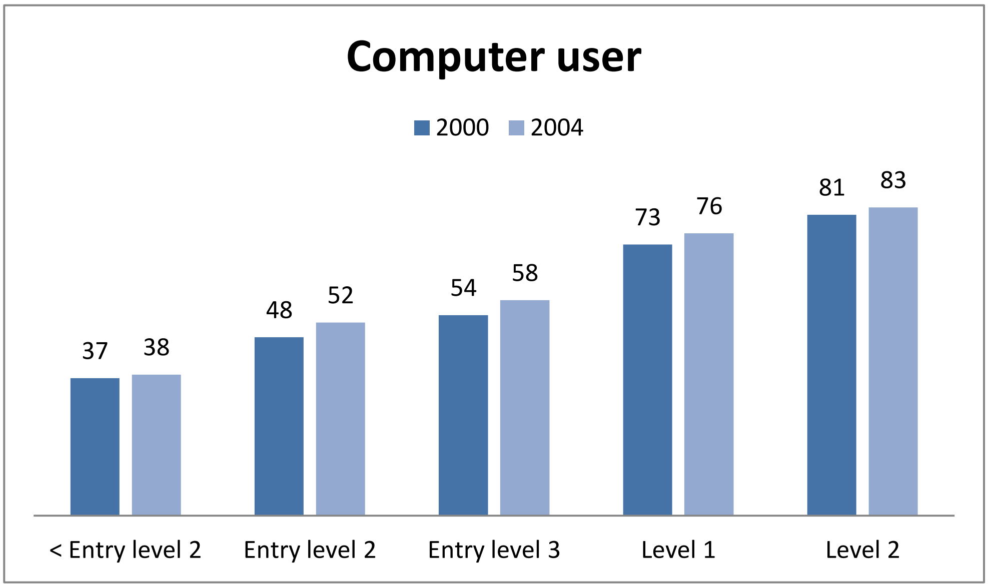
Figure 8: Main digital divide indicators in 2000 and 2004 by gender



As Figure 9 illustrates, numeracy skill levels are directly associated with the computer access and use as well as internet use. Those with higher levels of numeracy are not only more likely to have access to a computer, but also to be computer and internet users. Moreover, among those whose numeracy skills are higher there was a greater increase in the proportion having and using a computer at home compared to those whose numeracy skills were below Entry level 2.

Figure 9: Main digital divide indicators in 2000 and 2004 by numeracy level





As Table 5 shows, general educational qualifications are also associated with the digital divide. Not only are those with lower qualifications less likely to have and use a computer and the internet, the proportion of those who have access to and use a computer at home increases more slowly in this group than in other groups.

Table 5: Main digital divide indicators in 2000 and 2004 by highest qualification

	Computer at home		**Computer user at home**		**Internet user**		**Computer user**	
	2000	**2004**	**2000**	**2004**	**2000**	**2004**	**2000**	**2004**
none	34%	42%	20%	29%	19%	54%	37%	40%
NVQ level 1	39%	47%	25%	34%	25%	63%	48%	48%
NVQ level 2	43%	56%	28%	43%	30%	72%	57%	60%
NVQ level 3	52%	64%	39%	54%	44%	81%	73%	70%
NVQ level 4	65%	82%	50%	70%	63%	89%	85%	86%
NVQ level 5	72%	89%	61%	80%	80%	97%	92%	96%

4. Modelling the relationships among divides across time

This section reports on the results of the structural equation modelling (SEM), which was used to determine the changes in the three domains of numeracy proficiency, employment and ICT use and how these changes are related to each other.

4.1 Basic model

The basic model (see Figure 10 below) estimates the strength of the relationships between (i) numeracy proficiency, (ii) time spent in employment and (iii) ICT use, after controlling for gender, highest qualification achieved at age 30, and number of dependent children. (Figures included in parenthesis in the text and in the models are the standardised coefficients that show the strength of these relationships.)

For the main paths of interest (cross-lagged) the model demonstrates a clear effect of ICT use at Time 1 on numeracy proficiency at Time 2 (standardised coefficient of .17). There is also a statistically significant, but quite weak, effect of time spent in employment at Time 1 on numeracy proficiency at Time 2 (.09) and an even smaller effect of ICT use at Time 1 on change in time spent in employment at Time 2 (.04) and the other way round (.02).

The data suggest that women tend to have lower numeracy skills and are more likely not to be in employment, and, if employed, to have shorter, or more sporadic, spells of employment. There does not appear to be a relationship between ICT use and gender.

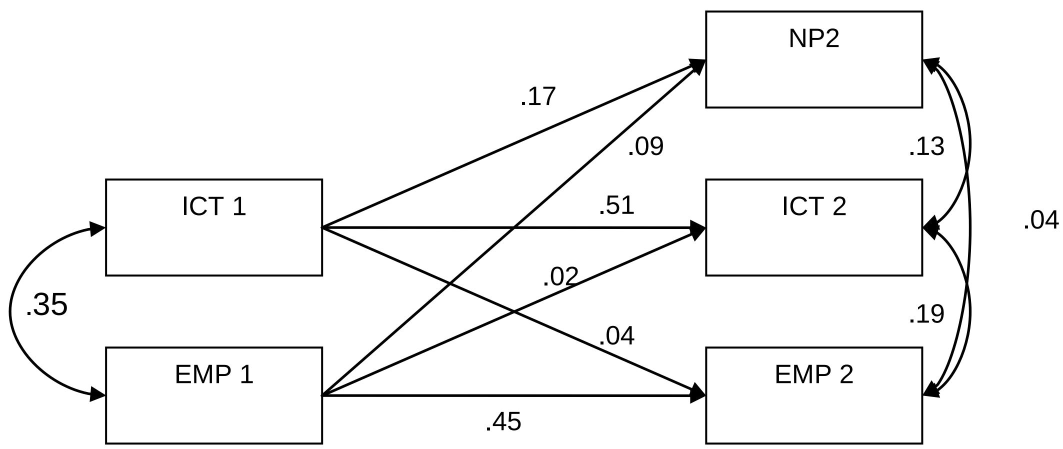
The highest qualifications achieved at Time 1 show statistically significant positive paths to numeracy proficiency (.31), ICT use (.18) and a much weaker, but still significant path to employment at Time 2 (.04) (see Appendix A). This suggests that those who are more highly qualified have better numeracy, are more regular users of ICT and are more likely to have stable employment.

The more dependent children people have, the more likely they are to have sporadic spells of employment, the better they score in the numeracy test, but the less change they experience in their computer use.

Looking next at the straight lines representing stability of measure over time, there is evidence of stability of both employment and ICT use between Time 1 and Time 2 with ICT use somewhat more stable over time (.51) than time spent in employment (.45). Those who had access to a computer and used it fairly often at home or work at Time 1 were very likely to do so at Time 2, and even to increase this use. Similarly, those who were employed for all or most of the two years before the Time 1 interview were likely to replicate this employment pattern in the two years before the Time 2 interview.

Turning finally to concurrent relationships, the model demonstrated a very low correlation between numeracy proficiency and time spent in employment at Time 2 (.04) in contrast to the medium correlation between ICT use and employment at both time points (.35 Time 1; .19 Time 2) and ICT and numeracy proficiency at Time 2 (.13). These results indicate that more time spent in employment and, even more strongly, greater ICT use, boost numeracy proficiency, rather than the other way round. The positive effect on numeracy proficiency of ICT use in the home is weaker than the positive effect of ICT use at work, which suggests that it is specifically the use of ICT in the workplace that drives the relationship and produces better employment outcomes and higher numeracy proficiency for individuals. Here it is important to look at these relationships against the context of occupational status (see section 5.2.2).

Figure 10: Basic model



NOTE: NP - numeracy proficiency, ICT - computer use, EMP - time in employment. All coefficients shown are statistically significant, p<0.01. Controlling for gender, number of children and highest qualification achieved at age 30.

4.2 Elaborated models

The next step in the analysis is to elaborate the model further, taking advantage of the large sample sizes.

4.2.1 Elaborated model I: men and women compared

Figures 11a and 11b show the results of the multi-group path analysis, splitting the sample by gender. Although most of the central relationships between use of ICT at Time 1 and 2 and numeracy skills were found to be the same for men and women, there were some notable differences in the models regarding the strength of other relationships.

The data provides evidence of a stronger positive effect of being employed for longer time spells and numeracy skills at Time 2 for men than for women (.14 compared to .07). All other cross-lagged paths are weaker for men than for women, and the effect of ICT use at Time 1 on the subsequent time spent in employment is not statistically significant.

There is no apparent effect of having dependent children on the computer use for men (see full model Appendix A), but a significant, if weak, impact on women. This may be related to the fact that women who have more children are more likely to spent time outside of the labour market and therefore may have fewer opportunities to use a computer at work; childcare commitments may also make these women less likely to use a computer at home.

The highest level of qualification has a stronger positive impact on the computer use and employment for men compared to women (.21 and .16 for computer use; .06 and .03 for employment accordingly).

The stability of the employment and ICT use variables is stronger for men than for women (.52 and .42 for employment; .53. and .40 for computer use). This can be explained by other factors that can influence time spend spent in employment, for example having children, that have positive effect on men (.04), but a strong, negative impact (-.18) on women.

This analysis of the concurrent and time variant relationships suggests the significance of employment in skills development, in particular ICT skills, for women and numeracy skills for men.

Figure 11a: Elaborated model, men

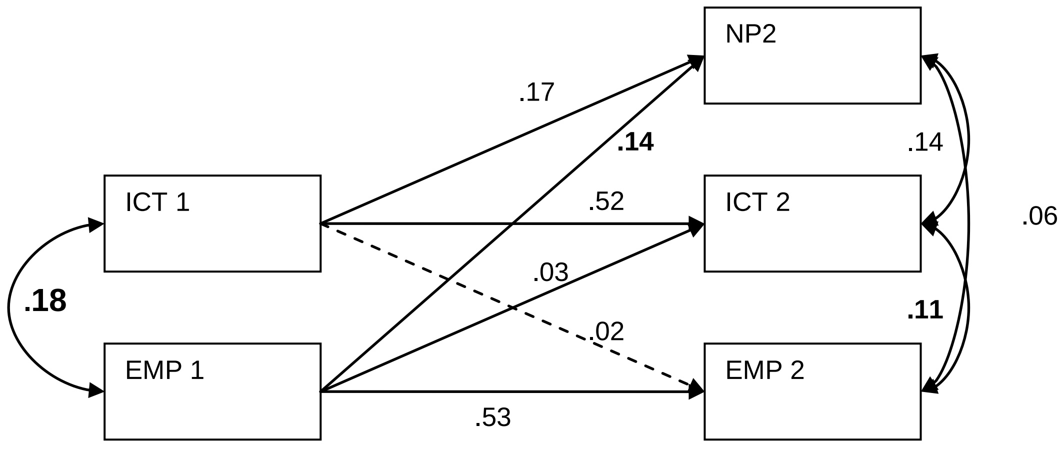
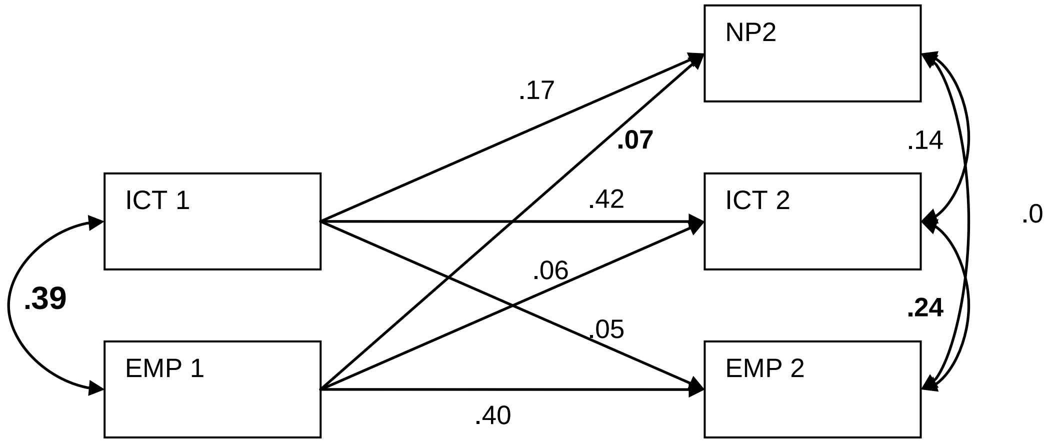


Figure 11b: Elaborated model, women

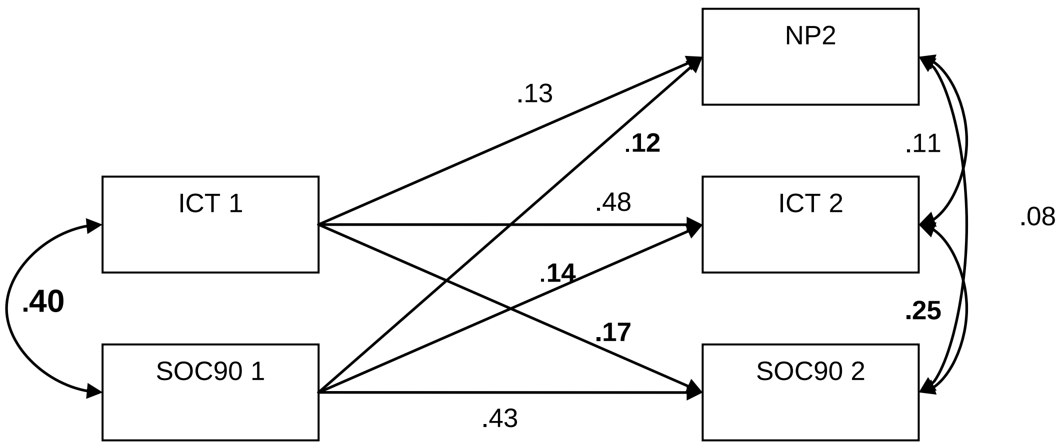


4.2.2 Elaborated model II: including occupational status

The next elaborated model investigated the three divides among the smaller subsample that were in employment at the Time 1 and Time 2 interviews (N=6,571). To do so, the variable for time spent in employment was replaced with a variable for type of occupation. This allowed researchers to investigate the relationships between skills and any movement towards jobs with a higher social occupation.

Looking first at all cohort members, the model (Figure 12) shows that occupational status at Time 1 is positively related to numeracy proficiency (.12) and increase in ICT use (.14) at Time 2.

Figure 12: Elaborated model including occupational status



In other words, individuals whose occupational status was higher in 2000 are more likely to have better numeracy skills in 2004 and more likely to make greater use of ICT at work and at home. Also, greater use of ICT in 2000 is associated with an upward move in occupational status (.17) and higher numeracy proficiency in 2004. As occupational status in 2000 is strongly related to occupational status in 2004, there appears to be relatively little individual movement across the four-year period.

In this model the correlations between ICT use and occupational status at Time 1 and Time 2 as well as numeracy proficiency at Time 2 remain significant and positive. This suggests that those in higher status jobs tend to have better numeracy skills and tend to be more frequent computer users.

Most of the cross-lagged path correlations are much stronger for the occupational status variable than the variable for time spent in employment (see Table 7). This suggests that numeracy and ICT skills are more important for upward mobility within the labour market than entry to the labour market and, moreover, that workplace training in numeracy and ICT could increase occupational mobility.

The full model with occupational status is included in Appendix A.

Table 7

	TIME 1		**TIME 2**	
Predictors or covariates	**Time spent in employment**	**Occupational status**	**Time spent in employment**	**Occupational status**
Computer use Time 1	.35	.40	.02	.17
Computer use Time 2	.04	.14	.19	.25
Numeracy proficiency Time 2	.09	.12	.04	.08

4.2.3 Elaborated model III: by gender and occupational status

Next, the model replacing time spent in employment with occupational status was evaluated separately for men and women. As Figures 13a and 13b show, there are very few significant differences between the two models.

The relationship between occupational status at Time 1 and numeracy proficiency at Time 2 was slightly stronger for men than for women (.14 and .10). By contrast, more frequent computer use gave women a slightly higher premium for occupational mobility than men (.19 and .15). However, as employed women in the sample tended to have a higher occupational status in 2000 than men and also to have slightly more upward mobility between the two time points, this difference probably stems from the different types of job men and women have and the different use of ICT in these roles.

Figure 13a: Elaborated model including occupational status, men

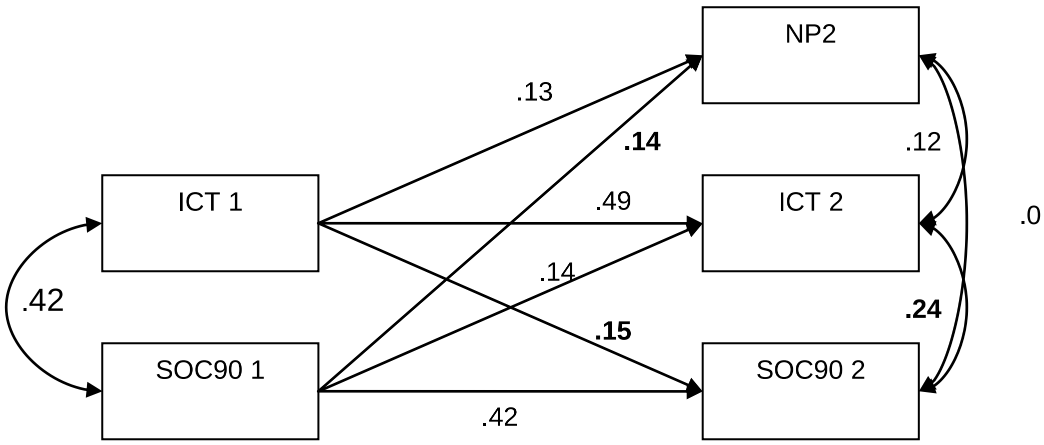
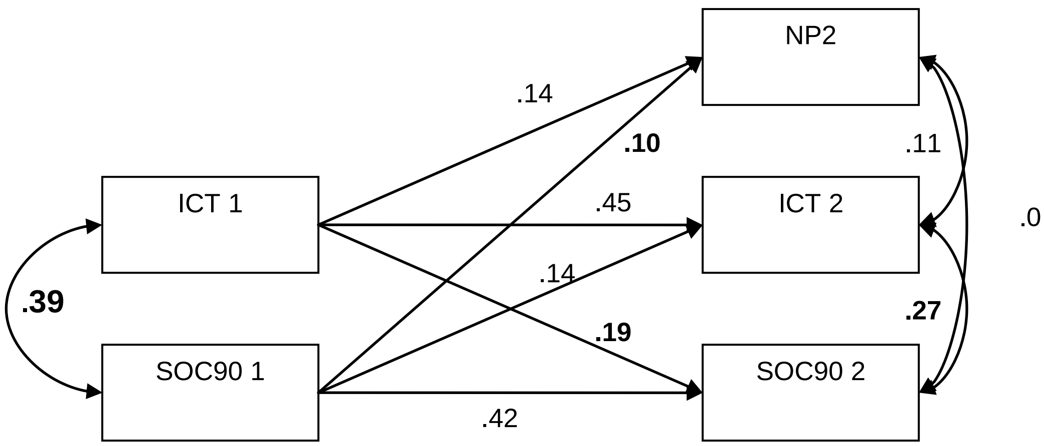


Figure 13b: Elaborated model including occupational status, women



4.2.4 Elaborated model IV: low and high qualifications compared

The two next elaborated models investigated the relationships between the three variables for individuals with low (NVQ Level 2 and below) or no qualifications and individuals with higher qualifications (NVQ Level 3 and above).

As Figures 14a and 14b illustrate, for those with low or no qualifications, time spent in employment had a stronger influence on numeracy proficiency in 2004 than it did for those with better qualifications (0.14 and 0.05). The same observation holds good for ICT use at Time 2 (0.08 and 0.01) suggesting that, for those with low qualifications, being in work is significant both in improving numeracy and leading to more frequent ICT use and thus potentially to an increase their digital competency.

Although in 2000 there were only slight differences between low and high qualified cohort members in terms of their use of ICT at work and at home, by 2004 the difference was considerably more profound. At Time 2, the association between time spent in employment and use of ICT was greater for those with higher qualifications; this is because job type is dependent on qualifications and labour market conditions.

Figure 14a: Elaborated model: low qualifications (none or NVQ L2 and below)

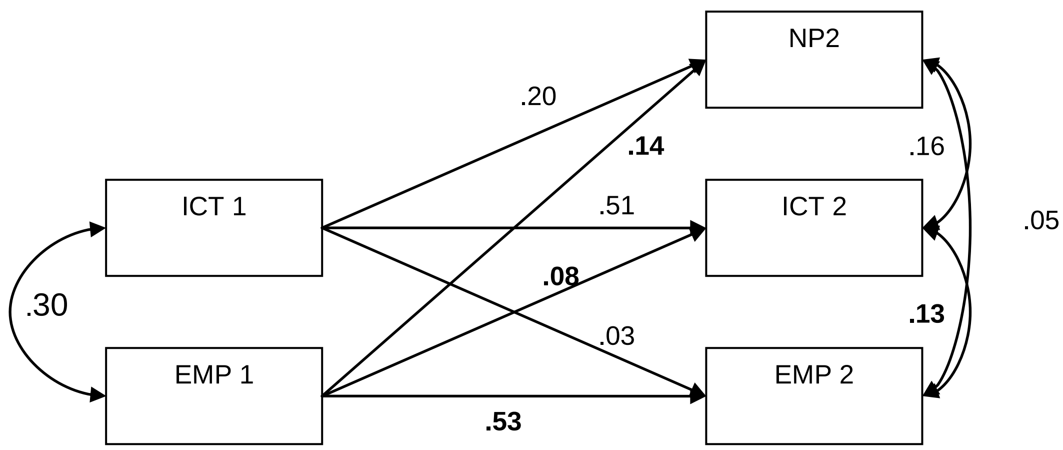
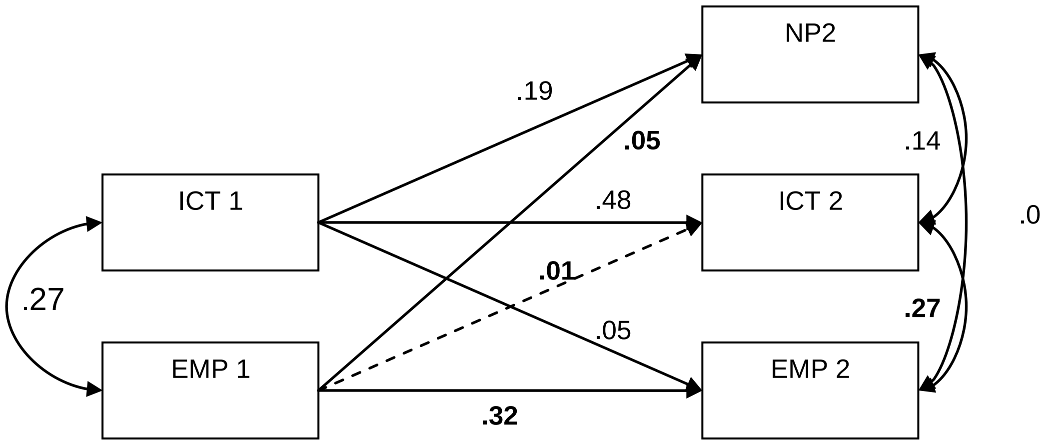


Figure 14b: Elaborated model: medium and high qualifications (NVQ L3 or above)



Looking lastly not at time spent in employment, but occupational status and mobility, the analysis shows (see Appendix A) no significant differences with regard to the relationships between numeracy proficiency and two other divide variables, that is computer use and occupational status, for those with higher and lower qualifications.

5 Discussion and conclusions

5.1 Main findings

The rapid development of digital technologies means that the possession of good ICT skills is an increasingly significant factor in individual employability. At the same time, employers increasingly require evidence of educational achievement, in the form of qualifications, when recruiting employees. This includes certification of competencies in literacy, numeracy and ICT, not only in and of themselves but as the foundations for other qualifications. Adults whose numeracy skills and ICT skills are poor are likely to have fewer opportunities to enter the labour market and fewer opportunities to progress within their jobs. Individuals on the wrong side of the numeracy and digital divides face employment trajectories characterised by casual work interspersed with periods of unemployment and, in times of economic uncertainty, are likely to be the first to lose jobs, and the last to gain employment when the labour market stabilises.

Although there is clear evidence of decreased life chances for those individuals whose numeracy is poor, or who spend time out of employment, or who lack ICT skills, there is little understanding of the relationship between these three points where the life chances of the "haves" and "have nots" divide. This study is designed to addresses this evidence gap through an examination of data from the British Cohort Study (BCS70), a longitudinal study of a cohort of individuals born in 1970 in England. It asks whether enhanced numeracy proficiency is a driver of employability and more frequent computer use (with its implied effect on IT competence) or whether the main flow of influence is in the opposite direction.

Using structural equation models this study establishes the strength of relationships among the key variables across time and, importantly, their direction. In initial analysis, both ICT usage and employment patterns appear quite stable over time, evidence in itself of the validity of viewing type of employment and ICT use as dividing points. Looking at the relationship between these two variables and numeracy skills, it appears that numeracy proficiency increases when time spent in employment increases or when an individual's use of ICT increases, and that the same observation does not hold in reverse. Moreover, the analysis suggests that numeracy proficiency and ICT competence are more important for social mobility within the labour market than entry to the labour market. A higher premium was placed on better numeracy skills and more frequent ICT use for building the competence needed to progress to higher status jobs compared to obtaining or staying in employment.

The analysis also identified significant gender differences. For women, frequency of ICT use was more strongly related to finding a job and progression to higher status jobs. For men getting a job and progressing to a higher status job were more strongly related to greater numeracy proficiency. This finding has to be considered in the context of gender biased labour market, with men and women being disproportionally selected into specific occupations which often require a specific set of skills and involve certain levels of ICT and numerical competence.

For those with low qualifications, being in more stable employment was more closely aligned with increased numeracy proficiency. Moreover, more frequent ICT use for this group was also associated with less sporadic, stable employment compared to those with medium and high qualifications.

For women, and those with low qualifications, ICT use and numeracy skills developed outside the labour market, at home or in classes, could boost employment prospects. Enhanced numerical and digital skills (as evidenced in increased ICT use) are likely to strengthen engagement with the labour market and social mobility that in turn will further develop the skills. As this study demonstrates, lack of ICT access and use, coupled with poor numeracy, is related to poor employability and this is further associated with lower skills in the future. The consequence is more, rather than less, marginalisation in the labour market. It follows that adult education provision needs to be improved and updated continually so that it keeps up with employment demands.

The findings from the study suggest that boosting numeracy proficiency and ICT access and use is unlikely to be sufficient to erase divides between the "haves" and "have nots" and decrease the labour market marginalisation processes. A combination of provision that raises digital and numeracy competences and opportunities for employment where those skills can be practised is required. It is important that all potential employees have access to numeracy and ICT skills outside the labour market, but also to appropriate workplace support and provision. For those in employment, skills enhancement has the benefit of supporting career progression, motivating further skills learning and contributing to workplace productivity. This underlines the importance of adult continuing education provision to supply the stepping stones to, and within, jobs and social mobility opportunities to increase social equality and help those who are disadvantaged in the labour market by their low ICT competencies and numeracy proficiency.

5.2 Limitations to the study

The use of the cohort data has many advantages, but it also brings some limitations. Secondary data analysis can only access what has been measured as a general process of data collection. Since cohort studies usually try to cover a wide range of topics, there are often very few questions covering some of the themes, and therefore analysis on some topics cannot be as in-depth as researchers might like. In this case, numeracy proficiency was measured only in one point in time only and we could not investigate longitudinal relationships between numeracy skills and ICT use and competencies as well as employment patterns.

To produce a more in depth analysis and stronger causal claims, more time points for each measurement would be required, and would allow for the analysis of longitudinal trends.

Finally, although cohort studies are longitudinal panel studies with all the advantages of these data, the results can be generalised only to a specific cohort of people and no age comparisons are possible.

5.3 Further research

Future research on this subject could include comparison of literacy and numeracy competences and the relationship between these skills and employment, ICT use and ICT competencies. This study was able only to look at a proxy for ICT competence; further research is needed that would employ data on the ICT skills directly, rather than through this proxy measurement.

This research also used data from just one cohort born in 1970; it would useful to investigate the relationships between numeracy, employment and ICT using data from other cohorts and general panel studies to investigate how different age groups might be differently affected.

There is also need for mixed methods studies that would combine the use of statistical data with qualitative interview or observational data to look not only at the effects of poor numeracy, but also to explore the mechanisms of the relationships between the numeracy, employment and ICT to answer the “why” and “how” questions.

Finally, this study demonstrates the potential significance of the workplace in learning; further research is needed into the impact of workplace learning on numeracy and ICT competencies as well as on occupational mobility.

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Appendix A: Full Models

Table A1: BCS70 estimates for basic model by gender (fully saturated results)

	ALL		MALE		FEMALE	
	Std. Estimate	**S.E.**	**Std. Estimate**	**S.E.**	**Std. Estimate**	**S.E.**
NUMERACY TIME 2						
Computer use Time 1	0.17***	0.01	0.17***	0.02	0.17***	0.02
Time spent employed Time 1	0.09***	0.01	0.14***	0.02	0.07***	0.02
Highest qualification achieved at Time 1	0.31***	0.01	0.30***	0.02	0.32***	0.01
Gender	-0.12***	0.01				
Number of children	0.03**	0.01	0.02***	0.01	0.03*	0.02
R-square	*0.22*		0.20		0.19	
COMPUTER USE TIME 2						
Computer use Time 1	0.51***	0.01	0.52***	0.01	0.42***	0.01
Time spent employed Time 1	0.02*	0.01	0.03*	0.01	0.06***	0.01
Highest qualification achieved at Time 1	0.18***	0.01	0.21***	0.01	0.16***	0.01
Gender	0.01	0.01				
Number of children	-0.03***	0.01	0.00	0.01	-0.09***	0.01
R-square	*0.38*		0.42		0.32	
TIME SPENT EMPLOYED TIME 2						
Computer use Time 1	0.04***	0.01	0.02	0.02	0.05***	0.01
Time spent employed Time 1	0.45***	0.01	0.53***	0.03	0.40***	0.02
Highest qualification achieved at Time 1	0.04***	0.01	0.06***	0.02	0.03*	0.01
Gender	-0.14***	0.01				
Number of children	-0.09***	0.01	0.04***	0.01	-0.18***	0.01
R-square	*0.32*		0.29		0.27	
CORRELATIONS						
Numeracy and computer use at Time 2	0.13***	0.01	0.14***	0.02	0.14***	0.01
Numeracy and time spend employed at Time 2	0.04**	0.01	0.06***	0.02	0.03*	0.02
Computer use and time spent employed at Time 2	0.19***	0.01	0.11***	0.02	0.24***	0.01
Computer use and time spent employed at Time 1	0.35***	0.01	0.18***	0.01	0.39***	0.01
N of observations	**8872**		**4174**		**4698**	

*† p ≤ .1; * p ≤ .05; ** p ≤ .01; *** p ≤ .001*

Table A2: BCS70 estimates for elaborated model by gender (fully saturated results) with occupational status

	ALL		MALE		FEMALE	
	Std. Estimate	**S.E.**	**Std. Estimate**	**S.E.**	**Std. Estimate**	**S.E.**
NUMERACY TIME 2						
Computer use Time 1	0.13***	0.01	0.13***	0.02	0.14***	0.02
Occupation status Time 1	0.12***	0.01	0.14***	0.02	0.11***	0.02
Highest qualification achieved at Time 1	0.27***	0.01	0.25***	0.02	0.29***	0.02
Gender	-0.15***	0.01				
Number of children	0.02†	0.01	0.01	0.02	0.03†	0.02
R-square	*0.19*		0.17		0.18	
COMPUTER USE TIME 2						
Computer use Time 1	0.48***	0.01	0.49***	0.02	0.45***	0.02
Occupation status Time 1	0.14***	0.01	0.13***	0.02	0.14***	0.02
Highest qualification achieved at Time 1	0.14***	0.01	0.16***	0.02	0.11***	0.02
Gender	0.03***	0.01				
Number of children	-0.02*	0.01	-0.01	0.01	-0.04**	0.02
R-square	*0.39*		0.40		0.34	
OCCUPATION STATUS TIME 2						
Computer use Time 1	0.17***	0.01	0.15***	0.02	0.19***	0.02
Occupation status Time 1	0.43***	0.01	0.42***	0.02	0.42***	0.02
Highest qualification achieved at Time 1	0.16***	0.01	0.16***	0.02	0.15***	0.02
Gender	0.03***	0.01				
Number of children	-0.03**	0.01	0.01	0.01	-0.08***	0.02
R-square	*0.37*		0.36		0.39	
CORRELATIONS						
Numeracy and computer use at Time 2	0.11***	0.01	0.12***	0.02	0.11***	0.02
Numeracy and occupation status at Time 2	0.08***	0.01	0.08***	0.02	0.08***	0.02
Computer use and occupation status at Time 2	0.25***	0.01	0.24***	0.02	0.27***	0.02
Computer use and occupation status at Time 1	0.41***	0.01	0.42***	0.01	0.39***	0.02
N of observations	6571		3639		2932	

*† p ≤ .1; * p ≤ .05; ** p ≤ .01; *** p ≤ .001*

Table A3: BCS70 estimates for Basic model by qualifications (fully saturated results)

	ALL		Low qual		Medium and high qual	
	Std. Estimate	S.E.	Std. Estimate	S.E.	Std. Estimate	S.E.
NUMERACY TIME 2						
Computer use Time 1	0.17***	0.01	0.20***	0.01	0.19***	0.02
Time spent employed Time 1	0.09***	0.01	0.14***	0.02	0.05**	0.02
Highest qualification achieved at Time 1	0.31***	0.01				
Gender	-0.12***	0.01	-0.11***	0.02	-0.14***	0.02
Number of children	0.03**	0.01	0.04**	0.02	0.00	0.02
R-square	*0.22*		0.10		0.07	
COMPUTER USE TIME 2						
Computer use Time 1	0.51***	0.01	0.51***	0.01	0.48***	0.01
Time spent employed Time 1	0.02*	0.01	0.08***	0.01	0.01	0.02
Highest qualification achieved at Time 1	0.18***	0.01				
Gender	0.01	0.01	0.07***	0.01	-0.05***	0.01
Number of children	-0.03***	0.01	-0.03**	0.01	-0.07***	0.01
R-square	*0.38*		0.29		0.29	
TIME SPEND EMPLOYED TIME 2						
Computer use Time 1	0.04***	0.01	0.03**	0.01	0.05***	0.01
Time spent employed Time 1	0.45***	0.01	0.53***	0.02	0.32***	0.02
Highest qualification achieved at Time 1	0.04***	0.01				
Gender	-0.14***	0.01	-0.12***	0.01	-0.16***	0.01
Number of children	-0.09***	0.01	-0.07***	0.01	-0.12***	0.01
R-square	*0.32*		0.38		0.19	
CORRELATIONS						
Numeracy and computer use at Time 2	0.13***	0.01	0.16***	0.01	0.14***	0.02
Numeracy and time spent employed at Time 2	0.04**	0.01	0.05***	0.02	0.04*	0.02
Computer use and time spent employed at Time 2	0.19***	0.01	0.13***	0.01	0.27***	0.01
Computer use and time spent employed at Time 1	0.35***	0.01	0.30***	0.01	0.27***	0.01
N of observations	8872		4508		4364	

*† p ≤ .1; * p ≤ .05; ** p ≤ .01; *** p ≤ .001*

Table A4: BCS70 estimates for Elaborated model by qualifications (fully saturated results) with occupational status

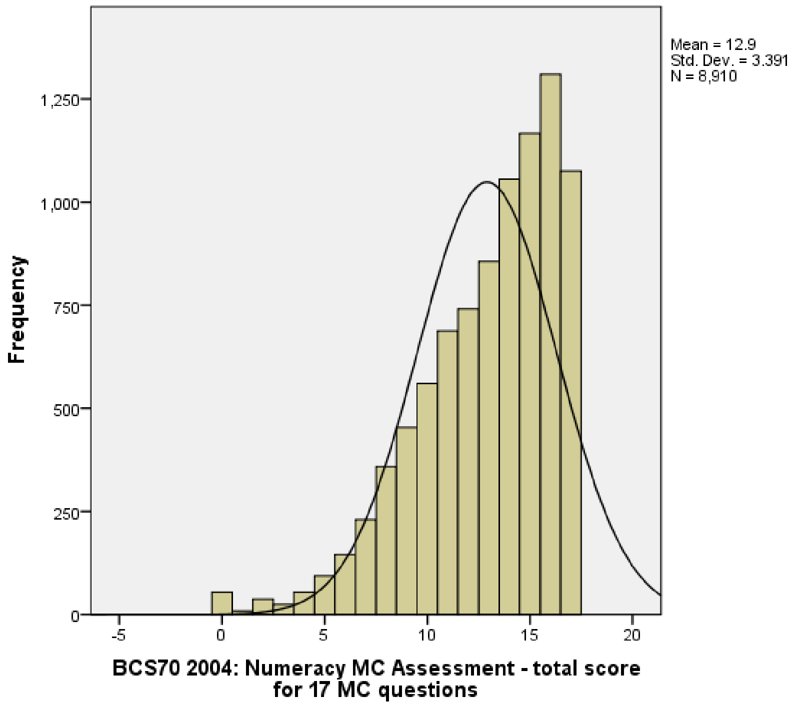
	ALL		Low qual		Medium and high qual	
	Std. Estimate	S.E.	Std. Estimate	S.E.	Std. Estimate	S.E.
NUMERACY TIME 2						
Computer use Time 1	0.13***	0.01	0.16***	0.02	0.14***	0.02
Occupation status Time 1	0.12***	0.01	0.14***	0.02	0.15**	0.02
Highest qualification achieved at Time 1	0.27***	0.01				
Gender	-0.15***	0.01	-0.16***	0.02	-0.16***	0.02
Number of children	0.02†	0.01	0.03†	0.02	-0.00	0.02
R-square	0.19		0.08		0.08	
COMPUTER USE TIME 2						
Computer use Time 1	0.48***	0.01	0.49***	0.02	0.48***	0.02
Occupation status Time 1	0.14***	0.01	0.15***	0.02	0.14***	0.02
Highest qualification achieved at Time 1	0.14***	0.01				
Gender	0.03***	0.01	0.07***	0.02	-0.01	0.01
Number of children	-0.02*	0.01	-0.02	0.02	-0.04**	0.01
R-square	0.39		0.32		0.30	
OCCUPATION STATUS TIME 2						
Computer use Time 1	0.17***	0.01	0.21***	0.02	0.14***	0.02
Occupation status Time 1	0.43***	0.01	0.44***	0.02	0.43***	0.02
Highest qualification achieved at Time 1	0.16***	0.01				
Gender	0.03***	0.01	0.04*	0.02	0.03†	0.02
Number of children	-0.03**	0.01	-0.02	0.02	-0.04**	0.02
R-square	0.37		0.30		0.25	
CORRELATIONS						
Numeracy and computer use at Time 2	0.11***	0.01	0.13***	0.02	0.11***	0.02
Numeracy and occupation status at Time 2	0.08***	0.01	0.08***	0.02	0.11***	0.02
Computer use and occupation status at Time 2	0.25***	0.01	0.29***	0.02	0.21***	0.02
Computer use and occupation status at Time 1	0.41***	0.01	0.33***	0.02	0.31***	0.02
N of observations	6571		3104		3467	

*† p ≤ .1; * p ≤ .05; ** p ≤ .01; *** p ≤ .001*

Appendix B: Miscellaneous

I. Figure B1 shows the distribution of numeracy scores. Although quite a high proportion of individuals received relatively high scores in their numeracy test, making the distribution positively skewed, a substantive number of cohort members are positioned at the lower end of the range. This highlights the numeracy problems faced by a rather large part of the sample.

Figure B1: Distribution of numeracy scores



II. As Table B1 illustrates, individuals who not in the labour force – that is temporarily or permanently sick/disabled; unemployed and seeking work; and looking after home /family (97% of whom are female) – are the most likely to have low numeracy skills.

Table B1: Distribution of numeracy levels by employment status in 2004

	BCS70 2004: Numeracy level				
	< Entry level 2	Entry level 2	Entry level 3	Level 1	Level 2
Full-time paid employee (30+ hours a week)	4.2	6.8	21.0	37.4	30.6
Part-time paid employee (>30 hours a week)	7.0	11.3	33.7	28.8	19.2
Full-time self-employed	5.5	7.6	20.8	40.6	25.5
Part-time self-employed	3.9	9.7	31.2	27.9	27.3
Unemployed and seeking work	10.0	11.2	29.4	28.2	21.2
Full-time education or on a government scheme for employment training	3.7	7.3	25.6	37.8	25.6
Temporarily or permanently sick/disabled	20.5	16.7	29.5	20.5	12.9
Looking after home/family	10.4	14.6	31.1	23.3	20.6
Other	5.5	10.1	27.5	33.0	23.9

Differences statistically significant, chi-square test p=.000, N=8,906

III.

Table B2: Distribution of numeracy levels by socio-economic classification status (NS-SEC 8 analytic version) those employed in 2004.

	BCS70 2004: Numeracy level				
	< Entry level 2	Entry level 2	Entry level 3	Level 1	Level 2
Higher managerial and professional occupations	0.7	2.5	8.7	40.4	47.6
Lower managerial and professional occupations	2.8	5.7	19.1	39.3	33.1
Intermediate occupations	4.6	9.4	30.5	34.3	21.3
Small Employers and own account workers	6.2	9.6	24.9	36.8	22.4
Lower supervisory and technical occupations	5.0	9.0	28.5	38.2	19.3
Semi-routine occupations	11.2	13.3	37.3	25.0	13.3
Routine occupations	11.0	13.9	34.9	25.5	14.7

Differences statistically significant, chi-square test p=.000, N=7.408