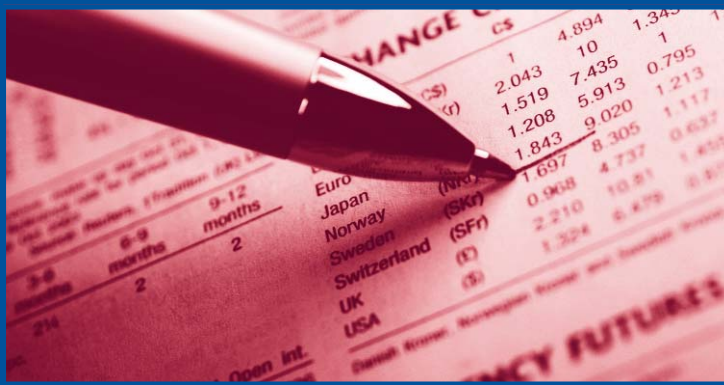Every Child
a Chance
Trust

The long term costs
of numeracy difficulties

January 2009

Every Child
a Chance
Trust

The Every Child a Chance Trust aims to unlock the educational potential of socially disadvantaged children through the development and promotion of evidence-based, early intervention programmes.

The Trust was established in 2007. It grew out of the outstandingly successful *Every Child a Reader* project, which showed that with the right intervention it is possible to tackle the literacy difficulties which blight many children's lives. This three-year £10m scheme was funded by a partnership of businesses and charitable trusts with matched funding from government.

The Trust was established to build on the power of this partnership, to transform the lives of individuals, document the long-term impact of early interventions on communities and prove the economic case for early investment – and as a result secure pick up of the charity's programmes at a national and local level.

www.everychildachancetrust.org

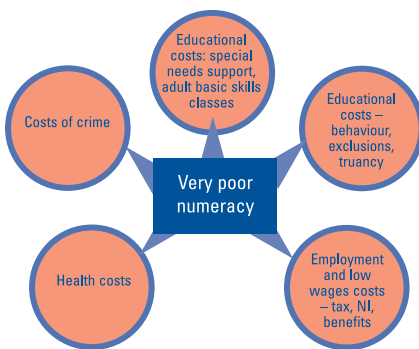# The long term costs of numeracy difficulties

Contents

Executive summary

This report was commissioned by the Every Child a Chance Trust, a charity that aims to unlock the educational potential of socially disadvantaged children through the development and promotion of evidence-based, early intervention programmes.

The context was the Trust's involvement in the *Every Child Counts* initiative, providing expert numeracy teaching to seven-year-old children who have failed to master basic numeracy skills.

The brief was to:

- review the research on the long term consequences of numeracy difficulties for individuals and for society;
- estimate the costs to the public purse that result;
- estimate the return on investment of early intervention to address numeracy difficulties.

The report builds on a companion study, *The long term costs of literacy difficulties*, first published in 2006 by the KPMG Foundation, and revised in 2009 to include data from recent research, and to align its methodology with that used in this concurrently published numeracy study.

Data are provided showing that there is considerable overlap between those with literacy difficulties and those with numeracy difficulties. To avoid 'double counting', a set of costs to the public purse is provided in this report that are specific to those with numeracy difficulties in the context of competent literacy. These are costs that would be incurred over and above those identified in the companion literacy report.

The research reviewed here shows that numeracy difficulties are linked to costly special educational needs provision, to truancy, exclusion from school, greatly reduced employment opportunities, increased health risks and an increased risk of involvement with the criminal justice system. Many of these increased risks operate over and above those associated with social disadvantage in general, those associated with concurrent literacy difficulties, and those associated with lack of qualifications.

The research suggests that numeracy difficulties play a distinctive role in restricting opportunities throughout the life course. Competent numeracy would thus appear not only important in relation to employability and the economy, but also as a protective factor in maintaining social cohesion.

We estimate that the costs to the public purse arising from failure to master basic numeracy skills in the primary school years, and related to all individuals with numeracy difficulties, are up to £2.4 billion every year. Costs related to individuals with numeracy difficulties only (not co-occurring with literacy difficulties) are estimated at up to £763 million each year.

On the basis of a 79% success rate and a unit cost of £2,600 per person, we estimate that annual savings of £1.6 billion would be made as a result of providing effective numeracy intervention at the age of seven to all of the 35,843 pupils who currently leave primary school each year with very low numeracy skills.

In our judgement the overall return on investment for every pound spent on the *Every Child Counts* programme, avoiding double counting in relation to children with co-existing literacy difficulties, is likely to be between £12 and £19.
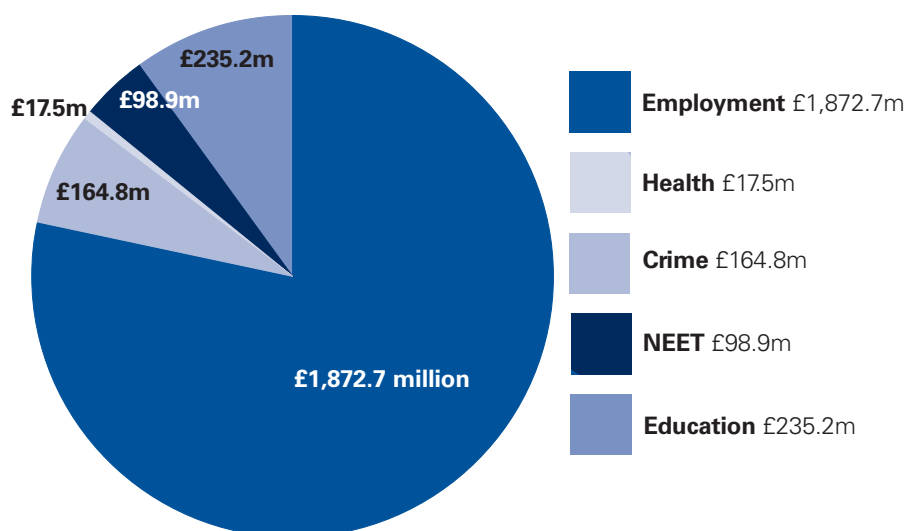
The table on the right shows the breakdown of the annual long term costs to the public purse incurred as a result of failure to address early numeracy difficulties.

Employment-related costs form the largest category. Costs to the education and criminal justice systems provide the next largest categories. Within education, the costs of numeracy failure are greater in the secondary phase than they are in the primary phase. The costs to primary schools of providing intervention outweigh the immediate benefits. This suggests that in economic terms it may be difficult to persuade primary schools to shoulder the full costs of intervention without targeted top-up funding.

The costs and potential savings identified in this report are indicative and should be treated with caution. Costs have been extrapolated from cohort studies that were carried out in a different economic climate and policy context from that in which seven-year-olds currently receiving help from *Every Child Counts* will live their lives. Many factors, moreover, will come into play over a person's lifetime that will mediate the relationship between early numeracy difficulties and later outcomes. The longer the interval, the harder it becomes to predict those outcomes.

It should also be noted, however, that we identify in this report a number of savings that are likely to be significant but could not be quantified, such as social services costs, social housing costs, the costs of generally poorer health, the costs of substance abuse over the age of 18, the costs of homelessness, the costs of women's involvement in crime, lost tax on pension income and the costs of intergenerational effects on numeracy skills. For this reason the conclusions we present in this report are in our view more likely to underestimate than overestimate the true costs of numeracy difficulties to society.

	Cost category	Total lifetime costs for the annual cohort of 35,843 children with numeracy difficulties
Education costs	Special needs support- numeracy (primary)	£51.5m
	Special needs support-numeracy and behaviour (secondary)	£90.5m
	Cost of maintaining a Statement of special educational needs	£83.4m
	Educational psychologist time	£4.1m
	Permanent exclusions	£0.9m
	Truancy	£2.8m
	Adult numeracy classes	£2.0m
	Education total	**£235.2**m
Employment costs	Lost tax and NI revenues	£774.6m
	Unemployment benefits	£392.9m
	Lost indirect taxes	£705.2m
	Employment total	**£1,872.7m**
Social costs associated with being NEET (Not in Education, Employment or Training)	Substance abuse and teenage pregnancy	£98.9m
	Social costs	**£98.9m**
Health costs	Depression	£17.5m
	Health total	**£17.5m**
Costs of crime	Costs of involvement with criminal justice system	£164.8m
	Crime total	**£164.8m**
	TOTAL	**£2,389.1m**

£235.2m
£17.5m
£98.9m
£164.8m
£1,872.7 million

Employment £1,872.7m

Health £17.5m

Crime £164.8m

NEET £98.9m

Education £235.2m

1. Purpose and scope of this report

1.1 This report was commissioned by the Every Child a Chance Trust, a charity which aims to unlock the educational potential of socially disadvantaged children through the development and promotion of evidence-based early intervention programmes. The context was the Trust's involvement in the *Every Child Counts* initiative, a national project that is providing expert numeracy teaching to seven-year-old children who have failed to master basic number concepts.

1.2 The brief was to:

- review the research on the long-term consequences of numeracy difficulties for individuals and for society;

- estimate the costs to the public purse that result;

- estimate the return on investment of early intervention to address numeracy difficulties.

2. The extent of numeracy difficulties in the adult population

2.1   Numeracy difficulties are very common in the adult population. In the government's 2003 Skills for Life survey more than 8,000 adults across England had their maths skills tested. From this data 15 million adults were estimated to have numeracy skills at or below entry level 3 - equivalent to the skills expected of an 11-year-old. Of these, 6.8 million had skills at or below entry level 2, the standard expected for a nine-year-old.

2.2   A Basic Skills Agency study in 1997 found that 74% of 37-year-olds have problems with division, 57% with subtraction, 15% could not manage their household accounts and 8% could only manage their household accounts with difficulty[1].

2.3   An on-line survey of 2006 adults aged 18 and above, conducted in 2008 by YouGov for the Every Child a Chance Trust , found that more than one in four adults admitted they had difficulties with mental arithmetic, and over a quarter sometimes struggled to add up prices in their heads when shopping.

2.4   Nearly half (47%) wished they had learnt more maths at school and just over half (51%) of mothers said that they struggled to answer mathematical questions which their children ask them. One in five adults in the 25-34 age range felt that greater ability in maths would have helped them get further on in their careers.

2.5   Women were much less confident (or perhaps more honest) than men - 34% said they had trouble working out sums in their heads, compared to 18% of men.

2.6   The survey found that difficulties with maths spread across social classes and all ages. 3% of ABC1s and 4% of C2DEs said they had to struggle with mental arithmetic in the shops most of the time. One third of the lower social groups (33%) said they felt uncomfortable in shops some of the time as compared to 25% of the top social groups. Those aged 55+ were the most confident (77%) compared to 65% of 25-34 year-olds, who were the least confident.

2.7   Recent surveys show widespread concern amongst employers about their employees' basic skills. The CBI's 2008 audit surveyed 735 firms employing 1.7 million people between them. Over half said they were concerned that they will not be able to find enough skilled people with the right qualifications in future. They had serious concerns about employees' ability to spot simple numerical errors, write in sentences, spell correctly and use accurate grammar. Some 40% of employers reported poor customer services and 34% lowered productivity as a result. Around a quarter were investing in remedial literacy and numeracy training.

3. Long-term outcomes of numeracy difficulties: scenarios

3.1 Numeracy failure starts early and becomes entrenched if not tackled. Data from longitudinal studies conducted by the Centre for Research on the Wider Benefits of Learning[2] shows that those who are very low attainers at 7 tend to remain so at 11, more so in mathematics than in literacy. Predictably, children from socially advantaged homes do better at 7 and 11; however, for children of parents with lower levels of education, doing well at 7, particularly in maths, is more important (i.e. more predictive of later attainment than for other groups). The researchers conclude that 'an emphasis on basic numeracy skills may particularly benefit children from socially disadvantaged backgrounds'.

3.2 Government statistics show that every year around 6% of eleven-year-olds in England leave primary school with very poor numeracy skills (below National Curriculum Level 3 in mathematics). This represents a maths level equivalent to that of the average seven- or eight-year-old.

3.3 The percentage of children leaving primary school with very poor numeracy skills has changed relatively little over time.

Percentage and numbers achieving below Level 3 in mathematics

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
%	7*	6*	6*	5*	5*	6.3	6.1	5.9	6.0	5.8
Numbers	47,138	41,478	40,992	34,940	30,720	40,079	37,484	35,843	34,560	33,022

*Pre-2003 data is only available rounded to the nearest percentage

3.4 Information on the profile of these very low-attaining children is available from an analysis conducted in 2005 by the Primary National Strategy[3].

- Boys are overrepresented in the overall numbers of children with very poor numeracy skills; 55% of this group are boys and 45% girls. This over-representation is much smaller in numeracy than it is literacy, however. In literacy 68% of the very low achievers are boys.
- More of the low-attaining children than would be expected from total population figures are summer-born – 40% compared to 34% of the total cohort.
- The children are much more likely to be living in poverty than their more numerate peers. 37% of those attaining below Level 3 in mathematics are eligible for free school meals, compared to 17% of all children.
- The children are more likely to be learning English as an Additional Language (EAL) than the population as a whole (15% compared to 10%), and slightly less likely to be of white UK origin (73% compared to 77%). Poverty appears to be more influential than either EAL status or ethnicity, however.
- Many of the children experience literacy difficulties as well as numeracy difficulties, but some have difficulties solely in mathematics. 2% of the age cohort of eleven-year-olds left primary school with very poor numeracy skills but adequate literacy skills (below National Curriculum Level 3 in maths but not English), 2.4% had very poor literacy skills but adequate numeracy skills (below National Curriculum Level 3 in English but not maths), and 3.9% had both very poor literacy and numeracy skills (below Level 3 in both English and maths).

3.5 The following scenarios illustrate the range of experiences that these innumerate children are likely to have over the life course. The scenarios have been chosen to exemplify key findings from research on the correlates and long-term consequences of early numeracy difficulties, summarised in section four of this report.

3.6 The research that has contributed to building these scenarios comes from a number of sources. Some is from specific studies of school-aged children with very poor numeracy skills; some from the two major national birth cohort studies that have followed up to adulthood thousands of children born in a single week in 1958 (the National Child Development Study, NCDS) and in 1970 (British Cohort Study, BCS70). Wherever possible, findings from these studies on those with very poor/very low numeracy skills (corresponding to a school-age below National Curriculum Level 3 measure, and affecting around 6% of the adult population) have been used. In some cases findings are only available on a larger group with poor/low numeracy skills (corresponding to a school-age below National Curriculum Level 4 measure and affecting around 20-23% of the adult population).

Scenario A

Paul was brought up on a troubled local authority housing estate with endemically high unemployment levels. He attended nursery class and started 'big school' with enthusiasm when he was just four. He tried hard, but by the end of his second year he had made almost no progress with maths or reading.

Paul's parents wanted the best for him, but did not see education as particularly important. Both his mother and father had had negative experiences of school themselves, and were alternately anxious and aggressive when in contact with their children's teachers. Paul's mother had significant numeracy difficulties that affected her ability to manage the family budget. As a result, she lacked any confidence in helping Paul at home with his maths. Paul's father did not see this as his role.

By the time he was seven Paul was well behind his peers and had come to feel, as had his parents before him, that school was not a place where he could succeed. Over the course of the next few years he became increasingly disaffected. He had help in a withdrawal group with his reading every year though no special help in maths.

At secondary school he had further help from the school's special needs department. He was placed in lower sets, attended poorly and was not entered for examinations. He left school at sixteen with no prospects of employment or training.

Scenario B

Kim, the youngest of five children, loved school and always tried her best but from the beginning struggled with some aspects of learning. Her home environment was warm and loving but her everyday experiences were limited; at seven, she had never travelled outside the immediate area she lived in. She read reasonably well but was not good at thinking of things to write about, or at maths – she could not seem to understand the number system or remember the simplest number facts. She had help in class from a teaching assistant who sat with the lowest attaining group, but her problems persisted right though her primary school years. The transition to secondary school proved a major trauma for her and her attendance began to slip. She did badly in exams and left school with few qualifications. For a year she worked in retail, until she became pregnant and later married in her early twenties. Soon after that came a bout of serious depression, and separation from her husband. Kim did not return to work and brought up the couple's three children on state benefits. It distresses her that she is not able to support her own children with their maths now that they too are now showing early signs of numeracy difficulties.

Scenario C

Saffron was of mixed white UK African-Caribbean heritage. Her mother had an explosive temper and often became agitated and upset in front of the children. Saffron's older siblings had been taken into care, but she and two younger brothers remained in the family home.

When she was six, Saffron was a very anxious learner, not liking to take risks or venture answers. This affected her progress across the curriculum. By her third year in school she had fallen well behind in both maths and literacy and was placed on the school's special needs register.

Seen as slow by her peers, she began to find friendships a problem. She became acutely embarrassed by her difficulties in taking part in class mental maths work and reacted by behaving badly. She appeared unhappy and was sometimes reluctant to go to school in the mornings. Her progress remained slow throughout primary school.

Her secondary school years were chequered by bouts of poor behaviour. She had a series of fixed-term exclusions culminating in a permanent exclusion. She spent some time out of school, during which she fell into bad company. Attempts to re-integrate her into another secondary school failed. She began to offend and had support from the local authority Young Offenders' Team, where a key worker encouraged her to enrol on college vocational courses. By now, however, her offending (fuelled by drug use) had become serious. She dropped out of college and a few months later began the first of several spells in young offenders' institutions.

4. Research on the long-term outcomes of numeracy difficulties

4.1 Research suggests that numeracy difficulties play a distinctive role in restricting opportunities throughout the life course. Competent numeracy would thus appear not only important in relation to employability and the economy, but also as a protective factor in maintaining social cohesion[4].

4.2 Very poor numeracy and special educational needs

4.2.1 The largest group of children requiring special educational needs (SEN) provision are those with difficulties in numeracy and/or literacy.

4.2.2 Children leaving Key Stage 1 at seven without having mastered the most basic numeracy skills will in almost all cases be identified by their primary school as having special educational needs and be placed on the 'School Action' or 'School Action Plus' stages of the national SEN Code of Practice. A difficulty with basic skills, in numeracy alone or in both numeracy and other areas of learning (the SEN categories specific learning difficulties and moderate learning difficulties), is the most commonly occurring type of SEN, more common than the category behavioural, emotional and social difficulties[5]. By the age of 11, 34% of children with very poor numeracy skills will have Statements of special educational needs.

4.3 Antisocial behaviour

4.3.1 There is a significant link between poor numeracy and antisocial behaviour. A number of researchers[6] have demonstrated the increased incidence of numeracy problems in children with social, emotional and behavioural difficulties. The link is evident even when other factors such as home background and general cognitive ability have been controlled for.

4.3.2 Pupils with poor numeracy skills are much more likely to be excluded from school than their peers.

4.3.3 Gross and McChrystal (2001)[7] found that more than half of permanently excluded pupils in their sample had very significant learning difficulties (in the lowest 2% of the population for numeracy and/or literacy attainment), in addition to significant emotional and behavioural difficulties.

4.3.4 An analysis by the Department for Children, Schools and Families of all pupils permanently excluded in Year 9 in the 2004-5 academic year data showed that pupils who entered secondary school with very low numeracy skills but good literacy skills (below National Curriculum (NC) Level 3 in Maths but not English) had an exclusion rate twice that of pupils entering Key Stage 3 at NC Level 4 or above in Maths. 0.2% of those with severe numeracy difficulties were excluded, compared to 0.1% of those with at least average numeracy levels. Where the numeracy difficulties occurred in the context of literacy difficulties (below NC Level 3 in both subjects) the exclusion rate was four times the average, at 0.4%.

4.3.5 Put another way, pupils entering secondary school below NC Level 3 in maths (but at average or above average levels in English) made up 6% of the cohort but 15% of exclusions (Figure 1).

Figure 1   Excluded pupils are more likely to have lower Key Stage 2 attainment
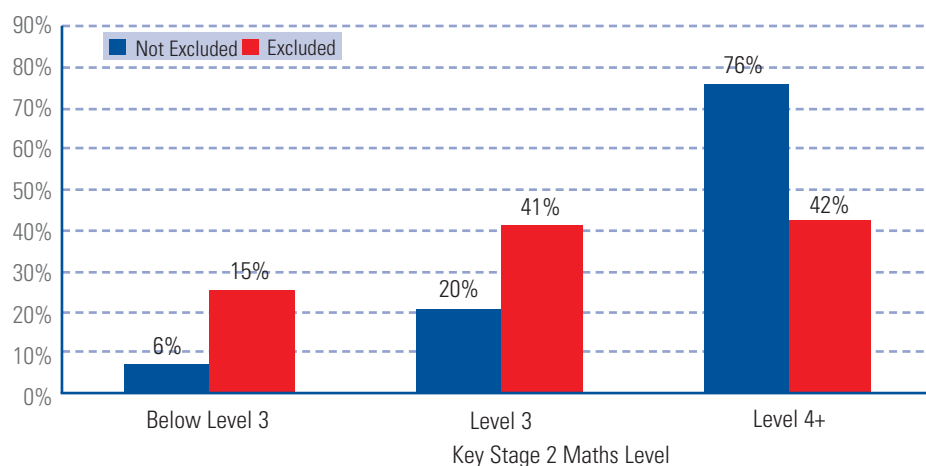
4.3.6   Outcomes for permanently excluded pupils are poor. In one sample 63% had criminal convictions by the age of 24, with a particular risk of involvement in violent crime, and a suicide rate 19 times the national rate for their age[8].

4.3.7   Truancy is also linked to poor attainment in maths. The 2006 DfES analysis of Year 9 pupils showed that those entering secondary schools with poor maths skills are over twice as likely to truant as are those who enter with age-appropriate skills. Of those who achieved below NC Level 3 at KS2 maths (but achieved level 4+ in English), 5% were classified as persistent truants in Year 9 compared to 2% of those who had been average or above average in maths.

4.4 Employment

4.4.1   Although there is a clear correlation between literacy and employment, for numeracy and employment the correlation is even stronger, with nearly four out of ten economically inactive women having very poor numeracy skills (adult national qualification Entry Level 2 or below[9]) and a similar pattern for men[10].

4.4.2   Looking internationally, a Canadian study found that numeracy is 'generally a statistically significant determinant of labour market status, whilst literacy is most often not statistically significant.'

4.4.3   Adults with adult qualification Level 1 numeracy or above (the equivalent of National Curriculum Level 3+ in school-age children) earn on average 26% more than adults with skills below this level. When controlling for education level, social class, parental interest in the child's education and type of school attended, there is still a 10% earnings premium for numeracy[11]. Research methods that are most likely to establish causality (Instrumental Variable results) confirm the strong and statistically significant relationship between adult numeracy and age 34 earnings[12].

4.4.4　Researchers at the London School of Economics have noted that the raw wage premium from having adequate numeracy skills (Level 1 or above in the adult skills framework) is actually greater now than it was in the early nineties[13]. They conclude 'the increase in the supply of literacy and numeracy skills since the early 1990s has been at least matched by the increase in demand for these skills, causing the return to these skills to remain stable'.

4.4.5　In their 1997 study of the impact of poor basic skills on 37-year-olds in the NCDS cohort[14], Bynner and Parsons, looking only at those who left school at 16 so as to control for the influence of extended education and resulting qualifications, found that by the age of 37 women with very low numeracy had on average 8.4 years in full-time employment compared to 10.6 years for those with average numeracy skills and 12.8 years for those with good skills. Men with very low numeracy had 15.5 years of employment compared to 18.9 years for those with average numeracy skills and 19 years for those with good skills.

4.4.6　In the same study, 19% of men with very low numeracy skills were unemployed or sick, compared to 3% of those with good numeracy skills. Those with poor numeracy skills at 37 had entered jobs earlier, at a time when those with better skills were still in education. By the age of 23, however, those with poor numeracy began to part company with the more skilled groups, and were more likely to be unemployed. The gap had widened with age, and at 37 those with very low numeracy skills were much less likely to be employed than those with good or average skills.

4.4.7　For both sexes, those with poor basic skills were least likely to have qualifications. If they were in work, they were more likely to be in the casual and unskilled parts of the labour market.

4.4.8　People with very low numeracy skills, compared to those with good skills, were two to three times more likely to be living in a household where both partners were out of paid employment.

4.4.9　Those with poor numeracy skills were much less likely to have ever received work-related training. 61% of women with very low numeracy had never been promoted at work compared to 34% of those with good numeracy. For men, the figures were 50% and 29%.

4.5 Health

4.5.1　Grinyer[15] found that poor numeracy, unlike poor literacy, is not associated with poor health. Other analyses, however, have found that having adult qualification Level 1 numeracy skills or above reduces the probability of having long term health problems by between six and nine percentage points, even allowing for educational levels and family background[16].

4.5.2　Adult Level 1 numeracy skills or above are for men associated with a 6 to 10 percentage point lower probability of being depressed. For women there is a 2 to 5 percentage point lower probability[1].

4.5.3 Bynner and Parsons asked 37 year olds in the NCDS study to report on their physical and psychological health over the last year. 11% of men with very low numeracy skills were classified as depressed, compared to 7% of those with average numeracy skills. Amongst women, 18% of those with very poor numeracy were depressed compared to 8% of those with average skills.

Figure 2 'Depressed' on the Malaise inventory
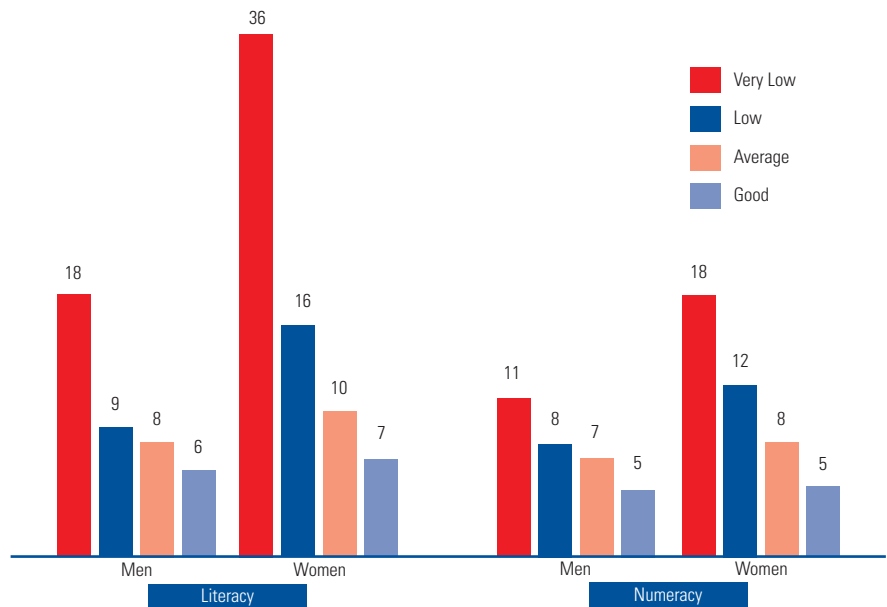
4.6 Health and family life

4.6.1 Adults with numeracy difficulties are much more likely to live in disadvantaged housing conditions than those with Level 1 or above skills. 10% of women with numeracy difficulties have experienced a period of homelessness, compared to 5% of all women. Women with very poor numeracy are more than twice as likely as women with Level 1 or higher skills to have been a teenage mother and three times more likely to have 4+ children at age 34[18].

4.7 Crime

4.7.1 The initial Basic Skills Agency assessment offered to all prisoners at the start of custodial sentences indicates that over two-thirds (65%) of prisoners have number work difficulties (at or below Level 1 in the adult national qualifications framework). The figure for literacy difficulties is lower, at 48%[19]. 25% of juveniles in custody have a numeracy age below that of the average seven-year-old[20].

4.7.2 Parsons[21], using data from the British Cohort Study (BCS 70) and National Child Development Study found that for women, poor numeracy skills were significantly correlated with criminality even after controlling for social disadvantage, poverty, disruptive family environment, poor education experiences and early signs of emotional and behaviour problems. For men, whilst the links to criminality were equally strong, some of the associations lost their statistical significance once all the other risk factors for crime were accounted for. The link between poor numeracy and the number of times they had been arrested, however, was still statistically significant when family background and childhood poverty measures were held constant.

4.8 Comparing the impact of poor numeracy with poor literacy

4.8.1 As discussed in section 3.4, there is considerable overlap between literacy and numeracy difficulties, but also some independence. It is important to establish which of the long term effects of numeracy difficulties relate specifically to numeracy rather than poor basic skills in general.

4.8.2 The issue of the relative impact of poor literacy and numeracy skills on life chances has been examined in the National Research and Development Centre for Adult Literacy and Numeracy report *Does numeracy matter more?*[22]

4.8.3 This study drew on the NCDS and BCS data and found that there was a mass exodus of men and women with either a poor grasp of literacy or numeracy from full-time continuous education at age 16; 85-92% of these groups of men, and 67-75% of the comparable groups of women left at the minimum statutory age. There were, however, no significant differences between those with just poor numeracy and those with both poor literacy and numeracy – numeracy difficulties on their own were as strong as determinant of early school leaving as were numeracy difficulties associated with poor literacy.

4.8.4 Further analysis concentrated just on those who left school at 16, thus controlling for a number of underlying factors that might independently affect long-term outcomes. The authors describe their methodology as follows: 'The results are based on comparing the strength of prediction of the adult outcomes from membership of the first three categories of our typology: (a) poor literacy/poor numeracy; (b) poor numeracy/competent literacy; (c) competent numeracy/poor literacy; with (d) competent numeracy/competent literacy, serving as a reference category or baseline. The numeracy 'effect' is demonstrated when a statistically significant prediction is obtained for (b) but not for (c). When only (a) shows the significant prediction, then poor literacy and poor numeracy in combination (i.e. poor basic skills generally) are implicated in the negative outcome. When (c) but not (b) shows the significant prediction, then poor literacy is identified as the key factor in the negative outcome rather than poor numeracy.'

4.8.5 The study found substantially more statistically significant effects on the age 30 outcomes for numeracy than for literacy (b compared with c) for both men and women. However, when the highest qualification level achieved was controlled for, the picture changed for men and women. For men the key predictor of the age 30 outcomes was poor basic skills generally, i.e. poor numeracy and poor literacy together. For women, however, poor numeracy was the more important predictor.

4.8.6 For men, the exceptions to this pattern were:

- participation in a company pension scheme, which was less likely for men with poor numeracy even when their literacy was good;

- the risk of depression, which was greater for men with poor numeracy even when their literacy was good;

- the probability of having been suspended from school, or arrested and cautioned by the police, which was higher for men with poor numeracy even when their literacy was good.

4.8.7. For women, poor numeracy was an independent predictor of:

- poor physical health;

- depression;

- a belief that they lacked control over their lives;

- the probability of being out of the labour market (regardless of how many children they had) or, if in work, of being in an unskilled or semi-skilled job;

- the probability of living in a household where no-one works.

4.8.8 The authors conclude that 'for women, while the impact of low literacy and low numeracy skills is substantial, low numeracy has the greater negative effect, even when it is combined with competent literacy'. They speculate that the reason for this may lie in changes in the nature of employment : 'Modern jobs of the kind that appeal to young women, e.g. managing accounts or using ICT equipment for administration, demand numeracy skills …poor numeracy skills make it difficult to function effectively in all areas of modern life, particularly for women.'

4.8.9 A number of authors have concluded that the economic benefits of improved numeracy skills may exceed those of improving literacy skills, at least for those who are already adults. A 2001 analysis by John Bynner and colleagues modelled the impact on the public purse of implementing either adult numeracy or adult literacy Skills for Life targets. This study found a much larger gain for the Exchequer from the former. For numeracy, the model showed a potential increase by 2010 of 100,300 in total employment, producing a net increase to government finances over benefits of £2.54 billion, compared to a rise in employment of 45,200 and a net benefit of £0.44 billion for literacy.

5. Methodology

5.1. Building on the research findings outlined in the last section, this section describes the methodology used to attach costs to the probable life experiences of those leaving primary school with very poor numeracy skills.

5.2 The methodology seeks wherever possible to establish which of the costs relate to numeracy difficulties alone, and which to numeracy difficulties occurring in the context of poor literacy.

5.3 We identified five different types of costs for children who have not learned to understand basic number concepts by the age of seven.
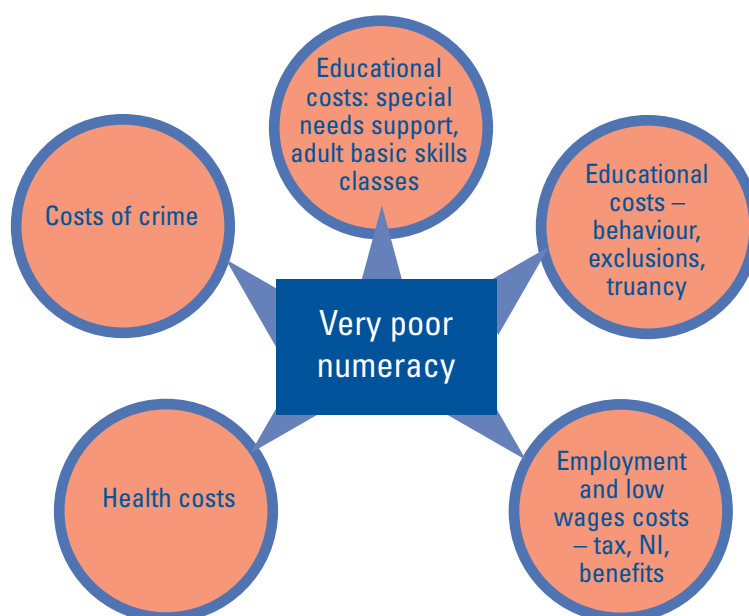
5.4 The estimation and full quantification of social costs depends on four critical pieces of data:
- population numbers;
- prevalence rates i.e. what percentage of the population have this problem or incur this cost;
- typical frequency and/or duration of the problem, i.e. number of episodes and over what period of time;
- unit cost information, actual or proxy, for each specific type of social cost.

5.5 The methodology is that used in a number of other economic benefits studies[24]. It has three stages:
- identifying from the literature the potential effects of the variable under consideration (in this case, poor numeracy)
- estimating how many more individuals in the target population (those with poor numeracy) are likely to experience these effects than would experience the effect in the non-target population (those with average or above numeracy skills)
- multiplying this number by unit costs for the effects.

5.6 The **population number** for those with very poor numeracy skills was taken as 35,843 per year group. This was the number of children leaving primary school in 2005 with attainment below National Curriculum Level 3 in Maths (5.9 % of the age cohort). Of these 35,843 children, 19,686 were boys and 16,157 were girls. 2005 was the year group chosen because this was the last for which there are published data on the breakdown of pupils attaining below Level 3 by gender, SEN status, and whether the pupil also has concurrent literacy difficulties.

5.7 In calculating **prevalence rates** we have used a measure of differential incidence or use, subtracting the incidence or use of services in the population of those with average numeracy skills from that in the very low numeracy population. For example, if 2.8% of the school population have a Statement of special educational needs but 33.6% of children with numeracy difficulties have a Statement, the differential incidence is 30.8%.

5.8 The first estimation problem in this methodology is to establish the extent to which the differential incidence relates to poor numeracy status alone, or poor numeracy status in the context of poor literacy. Wherever possible, a separation has been achieved by using the data provided in the Parsons and Bynner *Does numeracy matter more?* study, which has separate incidence figures for poor literacy/poor numeracy, and poor numeracy/competent literacy groups, with competent numeracy/competent literacy groups serving as the population baseline. Where it has not been possible to use this data, as in the example of Statements of special educational need above, we cannot be clear about the extent to which differential incidence is due to general low skills rather than to numeracy in particular.

5.9 The second estimation problem is to establish the extent to which very poor numeracy status operates over and above other factors that tend also to be in operation for low-skilled children and adults, such as poverty, lack of parental involvement in learning, or slow cognitive development. Separating out those with poor numeracy/competent literacy and comparing them with those competent in both numeracy and literacy skills to an extent resolves this problem, in that we are then looking at numeracy-specific effects rather than general low skills linked to disadvantage. Wherever possible, moreover, comparison groups have been children and adults from other disadvantaged families, or from a population that is likely to share similar social characteristics (such as early school leavers).

5.10 The differential frequency methodology used here has limitations. It assumes that the impact of different factors on outcomes is additive, and does not take into account their possible interactions. Moreover, just because a factor or event occurs more commonly in those with poor numeracy than in those with average numeracy does not automatically mean that if the numeracy difficulty were addressed the factor or event would not occur. Only a prospective longitudinal study can establish this. It is planned that such a study will form part of the evaluation of the *Every Child Counts* programme, so that the estimates and hypotheses generated by the application of the differential frequency method can be reality-tested.

5.11 For the reasons given above, estimates in this report are indicative and therefore have to be treated with caution. All costs have been allocated to one of four categories, according to the degree of certainty that remediating the numeracy difficulty will prevent a particular long term cost. Costs are then presented as four cases, by degree of certainty. The four categories used are:

| **Case 1:** Very high certainty | The long term cost is a direct consequence of the numeracy difficulty and would clearly not be incurred if the child or adult concerned had average or above numeracy skills.

An example would be receipt of special needs support with mathematics, or electing to participate in adult basic skills classes |
|---|---|
| **Case 2:** High certainty | The long term cost is a direct consequence of the numeracy difficulty, but specific factors produce some variability in the probability that it will be incurred (an example being the involvement of an educational psychologist; this is dependent on the availability of EP time, which varies across the country);

or

Data have been taken from studies which control for **a large number** of co-occurring factors that might otherwise explain the link between the numeracy difficulty and the long-term outcome/cost.

An example in this category is the earnings premium attracted by achieving Level 1 numeracy in the adult skills framework, because the earnings premium used has been taken from studies that control for social class, early cognitive ability, home support for learning and a range of other factors that might mediate the link between higher earnings and numeracy levels at and above Level 1. |
| **Case 3:** Moderate certainty | Data have been taken from studies which control for **some** co-occurring factors that might otherwise explain the link between the numeracy difficulty and the long term outcome/cost, and so reduce the probability that remediating the numeracy difficulty would be sufficient to prevent the long term outcome/cost from occurring.

Examples here are the costs of truancy and exclusion from school. The differential exclusion and truancy figures used compare pupils with good numeracy/good literacy with pupils with poor numeracy/good literacy – thus in all probability controlling for **some** factors (such as general cognitive ability, social class) that might mediate the link with poor numeracy. |
| **Case 4:** Lower certainty | The long term cost is a direct consequence of the numeracy difficulty, but specific local factors produce a large amount of variability in the probability that it will be incurred (for example, the probability that a pupil will receive a Statement of special educational need);
or
Data have been taken from studies which do not control for co-occurring factors that might otherwise explain the link between the numeracy difficulty and the outcome/cost.

An example here would be involvement in crime for those whose early numeracy difficulties occurred in the context of simultaneous literacy difficulties. The differential frequencies used here are based on empirical data on the percentage of children with literacy difficulties who also have behaviour problems (and empirical data about the later costs of those with behaviour problems to the criminal justice system). These data do not, however, control for other factors (such as general cognitive ability and social class) that might explain the link. |
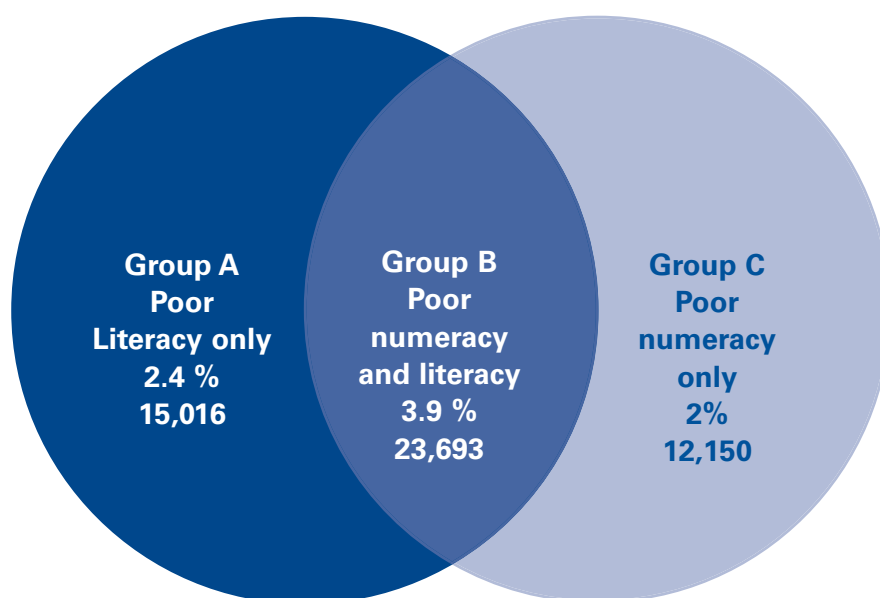
A full explanation of which costs have been allocated to each case, and why, is provided in Appendix 4.

5.12 Prevalence data came from two sources – actual information from longitudinal studies of children who had maths difficulties at school, and information from a single point in time on adults who form a proxy group for those who had poor numeracy skills in childhood (that is, those in the NCDS and BCS surveys who were assessed as having poor or very poor numeracy as adults). Since data on the NCDS survey population is only available up to the age of 37, we took that as the cut-off point for one set of costings. We also calculated lifetime costings for each case, based on extrapolating relevant to-age-37 costings to retirement age for employment-related factors, or to the average life expectancy for men and women for factors not related to employment.

5.13 It should be noted that lifetime figures can only be viewed as estimates, since they are extrapolated from cohort studies that were carried out in a different economic climate and policy context from that in which seven-year-olds currently receiving help from the *Every Child Counts* programme will live their lives. Many factors, moreover, will come into play over a person's lifetime that will mediate the relationship between early numeracy difficulties and later outcomes. The longer the interval, the harder it becomes to predict those outcomes.

5.14 We identified or assumed a frequency and/or duration for each problem and identified typical associated costs. We used these to work out a total cost to the public purse for that problem or event.

5.15 For many events we were not able to predict frequency, so only one episode was costed (for example, exclusion from school).

5.16 We have taken unit costs from other published cost-benefit studies, and from national sources for health and social care services, criminal justice and benefit receipts. We calculated other costs from first principles using agencies' data. We used 2008 as our cost year. 2008 price levels were applied for services as they would have been provided in 2008, using the best approximations to long-run marginal opportunity costs.

5.17 In calculating the return on investment for early numeracy intervention, we took a figure of 79% as the 'success rate'. This is based on findings from a study[25] of seven-year-olds who received the intervention programme Numeracy Recovery in one London borough, of whom 83% achieved the nationally expected Level 2+ at the end of Key Stage 1 (i.e. had been lifted out of the 'very low numeracy' category). The 83% success rate has been reduced to reflect a probability that not quite all of these children can be assumed to remain at nationally expected levels in succeeding years. At an estimated 79%, it matches that for which there is evidence from comparable early literacy intervention[26].

5.18 Costs have been calculated for three groups:

- All those with numeracy difficulties (Group B plus Group C below)

- Those with numeracy difficulties only (Group C below)

- Those with numeracy difficulties in the context of literacy difficulties (Group B below)

As reported in section 3.4, Department for Children, Schools and Families data show that in 2005 2% of the age cohort of eleven year olds left primary school with very poor numeracy skills but adequate literacy skills (below National Curriculum Level 3 in maths but not English), 2.4% had very poor literacy skills but adequate numeracy skills (below National Curriculum Level 3 in English but not maths), and 3.9% had both very poor literacy and numeracy skills (below Level 3 in both English and maths).

Group A
Poor
Literacy only
2.4 %
15,016

Group B
Poor
numeracy
and literacy
3.9 %
23,693

Group C
Poor
numeracy
only
2%
12,150

These figures have been used to derive from the 2006 KPMG Foundation report *The long term costs of literacy difficulties*, as updated in 2008, costs for the group (Group B) with very poor skills in both numeracy and literacy (3.9/6.3 X 100 (61.9%) of the literacy figures).

Costs for those with poor numeracy skills only (Group C) have been derived from research which separates out numeracy and literacy effects, such as Department for Children, Schools and Families data on truancy and exclusion rates amongst pupils with poor numeracy but good literacy skills, and the data in Bynner and Parson's 2005 *Does numeracy matter more?* study.

Example

Truancy

5% of the secondary school population who entered secondary school with very poor numeracy (but at least average literacy) are classified as truants (having 12 or more half-days of unauthorised absence per term) compared to 2% of the secondary school population who were average or above in both numeracy and literacy at entry. The differential frequency is therefore 3%.

Applying this figure of 3% to the numeracy-difficulties-only year group population of 12,150 (Group C) gives 364 more pupils with very poor numeracy skills who can be expected to be truants than would be expected if they were average at maths.

79% of these (288) can be assumed to escape truancy because early numeracy intervention has successfully lifted them out of very low numeracy levels.

The costs of truancy were identified as £1,830 per episode of truancy (£1,500 for one prosecution, plus two hours (at £15 per hour) of Education Welfare Officer time, inflated to 2008 prices).

We assumed one episode of truancy and located a one-off cost of 288 x £1,830 arbitrarily at the age of 14 for Group C.

Costs for Group B were calculated as 3.9/6.3 X 100 (61.9%) of the costs calculated in the Long term costs of literacy difficulties report.

An account of the methodology used for each outcome can be found in Appendix 4.

5.19 We have included in this report only 'hard' costs. 'Hard' costs in our terminology are the ones that mean that resources are spent or lost, and which have a direct monetary effect. 'Soft' costs – such as those associated with illness, loss of income or the stress or pressure borne by friends and family - have been excluded because information on them is scant.

5.20 We have not included the costs of intergenerational effects. These are likely to be very important (school-age children of parents with numeracy difficulties have nearly twice the relative risk of performing poorly in numeracy tests than children of parents with average numeracy, even when qualifications levels are taken into account)[27]. Similarly, we have not been able to quantify other important costs, such as social services costs, social housing costs, the costs of generally poorer health, the costs of substance abuse over the age of 18, the costs of women's involvement in the criminal justice system, and lost tax on pension income.

6. Cost assumptions

6.1 The prevalence rates, assumptions about frequency or duration and the unit costs used in this study are detailed in Appendix 1, together with the sources of information on which they are based. Costs have been drawn from a range of published sources, both government reports and reports produced by other agencies.

6.2 Unless stated otherwise, costs have been indexed to June 2008 prices using RPI (RP02).

6.3 A test discount rate (TDR) of 3.5% for the first 30 years, and a rate of 3.0% thereafter, has been assumed for all Net Present Value calculations.

6.3 Educational costs – special needs support

6.3.1 Special educational needs (SEN) costs to education were derived from information on the actual costs of providing SEN support in a sample of seven schools (five primary, two secondary) in seven different local authorities. The schools represented a range of points on the scale of social deprivation.

6.3.2. SEN costs of providing numeracy support for pupils entering Key Stage 1 below National Curriculum Level 2, or Key Stage 3 below Level 3 in maths, averaged out at £1,621 per pupil for the total Key Stage 2 phase (4 years, age 7-11) and £3,319 per pupil for the total Key Stage 3 and 4 phases (5 years, age 11-16).

6.3.3 These estimated SEN costs are conservative because they include few children with full Statements of special educational need. These schools were in local authorities whose funding policies that had successfully reduced reliance on Statements; children did not need to have a Statement in order to receive support. This is not yet the case in all local authorities, however. The issuing of Statements for children whose only problems are poor basic skills is declining nationally, but if the cost of Statements running at their current numbers is included (as in the lower-certainty case figures in this report) then an additional £1,989 per pupil per year needs to be added to the total per child lifetime costs of poor numeracy, to represent the costs of maintaining a Statement for 33.6% of pupils with very poor numeracy skills over their secondary school careers. Cost will have accrued in the primary school also, since the figure of 33.6% of all those achieving below NC Level 3 is based on 11-year-olds, but as no information is available on when these Statements were issued, it has not been possible to calculate a cost.

6.3.4 It has been assumed that without maths intervention pupils would have received three hours of input from an educational psychologist at a cost of £93 per hour. Again, this is a conservative estimate. If the pupil were assessed for a Statement of SEN, the actual educational psychologist time for an initial assessment and potential involvement in subsequent annual reviews would be very much greater.

6.4 Educational costs – truancy and exclusions

6.4.1 Data provided by the Department for Children, Schools and Families on the differential rates of truancy and permanent exclusions for Year 9 pupils who left primary school with very low numeracy levels (below National Curriculum Level 3 in maths, but Level 4 or above in English) have been used to estimate these costs, with the Year 9 differential used as a proxy indicator for a differential for the whole of Key Stages 3 and 4. Pupils were classified as truants if they had 12 or more half-days of unauthorised absence in the first term of the 2005-6 school year.

6.4.2 A frequency of one permanent exclusion (at a cost of £1,093) and one year in a pupil referral unit (at a cost of £13,712, less the Age-Weighted Pupil Unit (AWPU) that would otherwise have been spent on the pupil – approximately £3,277) has been assumed.

6.4.3 Similarly, a frequency of one episode of truancy has been assumed, at a cost of £1,793 for one prosecution, plus two hours (at £18 per hour) of Education Welfare Officer time. This is a conservative assumption; the probability is multiple episodes of truancy over Key Stages 3 and 4, but there are no data available on the exact frequency.

6.5 Educational costs – adult numeracy classes

6.5.1 People leaving school with very poor literacy or numeracy skills are likely to be encouraged to attend a course under the Skills for Life program. The Basic Skills Agency study *It doesn't get any better – the impact of poor basic skills on the lives of 37 year olds*[28] indicates that 16% of respondents with self-reported numeracy difficulties had attended a numeracy course by the age of 37.

6.5.2 The average costs of providing entry level literacy and numeracy courses are £960 per person. The resulting costs of providing this training have been calculated and spread evenly over the ages 16-37 and 16-60/65 (lifetime figures) earnings periods for men and women.

6.6 Cost of unemployment and low wages

6.6.1 In the costs relating to employment, we have not included the economic effects of reduced spending power, beyond those related to indirect taxation, nor the costs to industry of poor basic skills through, for example, lost orders and inefficiencies. An early study by the Basic Skills Agency estimated these as £4.8 billion per annum.

6.6.2 The costs that have been included relate to lost tax and National Insurance (NI) revenues to the Treasury, and the cost of unemployment benefits.

6.6.3 Differential time spent in full employment was used to cost the impact on tax and NI revenues. The Basic Skills Agency study *It doesn't get any better* showed that men with very low numeracy levels who left school at 16 have 3.4 years' less employment by the age of 37 than comparable men with average numeracy skills. For women, the differential is 1.54 years. These equate to differentials of 7.93 years and 3.23 years to the age of retirement for men and women respectively.

6.6.4 If remuneration is assumed at the average rate for men and women (from the Office for National Statistics 2006, indexed to 2008 rates using pay indices – also from the Office for National Statistics), and with tax and NI rates at the average rate (HM Treasury 2003-4) then a sum for differential tax and NI is obtained which has been spread evenly over a 21 year earnings period to age 37 or a 49 year earnings period to the age of 65 for men, and a 21 year earnings period to age 37 or a 44 year earnings period to the age of 60 for women.

6.6.5 It has been assumed that males not in employment for 7.93 years (the differential period) would be in receipt of Job Seeker's Allowance and housing and council tax benefits at the usual rate. The equivalent calculation was not undertaken for females, as it was considered less certain that when not employed they would be claiming Job Seekers' Allowance or other benefits.

6.6.6 For lost direct tax and NI revenues and indirect tax revenues, a sum for the differential employment period has been calculated and spread evenly over the relevant earnings periods for men and women.

6.6.7 Government research (*Improving adult basic skills,* 2001[29]) shows that men and women with poor numeracy skills earn on average 10% less than those with good numeracy, after controlling for social class, parental interest in the child's education, type of school attended and educational levels. The resulting lost tax and NI has been calculated and spread evenly over the earnings periods for men and women, less the period of time spent out of the labour market. This period was calculated using data from the Basic Skills Agency report *It doesn't get any better*[30], showing that by the age of 37 males without numeracy difficulties have been out of the labour market for 3.1 years on average, and females 10.8 years on average. These average rates were pro-rated upwards to obtain the average periods out of the labour market over the entire earnings periods for men and women. This gives 7.2 years spent out of the labour market for males and a corresponding 22.6 years for women. For women, the pro-rata period after the age of 37 is likely to be less, as they may well return to work after bringing up children. This means that the calculations here of lost tax and NI are likely to be conservative, as women's earnings periods may well be longer than those used.

6.7 Costs of being NEET (Not in Education, Employment or Training)

6.7.1. A 2002 Social Policy Research Unit report[31] provides estimates of the social costs incurred by this group as a result of underemployment, poor health, substance abuse, teenage pregnancy and involvement in the criminal justice system. These have been applied to the differential percentage of the very low numeracy group that would have been NEETs from 16-18, having first taken out costs already covered elsewhere in the current study, so as to avoid double counting. Costs taken out were the Job Seeker's Allowance (the data were prepared at a time when 16-17 year olds received JSA), the costs of crime and (for males only) the costs of being teenage mothers. These produce annual costs of £6,428 (male) and £11,092 (female). Costs for females are higher because of the high rate of teenage pregnancies in the NEET group. The costs taken from the SPRU report were assumed to be net of any savings to the education system resulting from early school leaving.

6.8 Health costs

6.8.1 We have only been able to include in health costs the costs of depression, and not costs associated with generally poor health, since these could not readily be quantified. The costs of substance abuse (including alcohol) are included within the costs of being NEET at the age of 16-18. They have not been quantified beyond this age range, as no information was available on the prevalence of substance abuse in the very low numeracy adult population.

6.8.2 The annual cost of depression was calculated from data used in Leon Feinstein's 2002 study for the Centre for Research on the Wider Benefits of Learning[32]. The study refers to NHS costs of depression of £420 million in 1993, as part of total costs of depression in that year of £3 billion. Feinstein looked at more recent data and estimated the public cost at £900 per year per depressed person. Using the 1993 proportion, we have estimated solely NHS costs based on the 1993 ratio of NHS costs to total costs. Differential rates of depression were confirmed by reference to the BSA study. Feinstein's costs related to the prevalence of psychiatric morbidity in the working age population. We have used data on those who were 'depressed' on the malaise inventory used in the Basic Skills Agency study I*t doesn't get any better.* We compared these figures (which were split by gender and numeracy levels) and noted that they showed levels of depression consistent with those used by Feinstein, confirming the validity of our use of Feinstein's data. This differential rate and annual cost was then applied from age 18 to age 37 (lower bound figures) and throughout the adult lives of the cohort (upper bound figures) using an average life expectancy of 88 for men and 92 for women (from the Office for National Statistics).

6.8.3 We have assumed that the differential rate of depression applies for adult life, and cannot be limited to a particular age range, so those with poorer numeracy levels will be more likely to experience depression whatever their age.

6.9 Costs of crime

6.9.1 In calculating the costs of crime that are linked to early failure to acquire basic numeracy we arrived at an estimate using the differential percentages supplied by the authors of the *Does numeracy matter more?* study. These show that amongst early school leavers, 40% of 30 year old men with very low numeracy but competent literacy reporting having been arrested by police over their lifetime, whereas 27% of 30 year old men with competent numeracy and literacy report having been arrested.

6.9.2 We used a cost figure of £13,804 for involvement in the criminal justice system. This figure is drawn from an empirical study by Stephen Scott and his colleagues at the Institute of Psychiatry[33] that actually followed up boys who had mild conduct problems at age 10 to the age of 28, and arrived at the actual costs of court appearances, probation, placement in young offenders' institution or prison.

6.9.3 No comparable empirical figures were available for girls, so it was not possible to include females in the cost estimates. Since research has shown that the links between poor numeracy and crime are even stronger for females than they are for males, this means that the figures calculated for crime are likely to be a considerable underestimate.

7. Costs of providing early intervention to tackle numeracy difficulties

7.1 The *Every Child Counts* initiative has developed a numeracy intervention programme at a cost of £2,499 per child (Appendix 3). This has been inflated to £2,582 at June 2008 prices. This includes the cost of equipment, teacher time, the professional development provided to the teacher by the local authority, and the support provided to the local authority by the national body which coordinates the programme.

8. The return on investment

8.1 Our judgement is that the overall return on investment for every pound spent on the *Every Child Counts* programme is likely to be in the order of £12 - £19.

8.2 This estimate is based on returns for those with numeracy difficulties only (in the context of competent literacy), so as to avoid any 'double counting' in relation to returns we have estimated in our companion report (*The long term costs of literacy difficulties*), for those with **both** poor literacy and poor numeracy.

8.3 The cost savings in this report are likely to be conservative. They do not include savings that could not readily be quantified, such as social services costs, social housing costs, the costs of generally poorer health, the costs of substance abuse over the age of 18, the costs of homelessness, the costs of women's involvement in crime, lost tax on pension income and the costs of intergenerational effects on numeracy skills.

8.4 The omission of these factors means that figures are likely to underestimate savings quite considerably. To balance this we have based our judgement of the likely overall return on investment on cost savings in the 'moderate certainty' category, rather than the very high/high certainty categories

8.5 Behind this overall estimate lie a range of possible costs and savings. We present below figures for:

- three different groups – all those with numeracy difficulties, those with numeracy difficulties only, and those with numeracy difficulties co-occurring with literacy difficulties;

- four different cost cases, ranging from very high certainty that eliminating the numeracy difficulty would prevent the cost being incurred, through to high, moderate and lower certainty.

8.6 For all those with numeracy difficulties, the total costs to the public purse arising from failure to master basic numeracy skills in the primary school years are estimated at between £4,000 and £44,000 per individual to the age of 37, and between £4,000 and £67,000 over a lifetime. This works out at a total of £144.0 million to £2,389.1 million every year.

8.7 For those with only numeracy difficulties, the total costs to the public purse arising from failure to master basic numeracy skills in the primary school years are estimated at between £4,000 and £42,000 per individual to the age of 37, and between £4,000 and £63,000 over a lifetime. This works out at a total of £48.6 million to £762.8 million every year.

8.8 For those with numeracy difficulties co-occurring with literacy difficulties, the total costs to the public purse arising from failure to master basic numeracy skills in the primary school years are estimated at between £4,000 and £46,000 per individual to the age of 37, and between £4,000 and £69,000 over a lifetime. This works out at a total of £95.3 million to £1,626.6 million every year.

8.9 The table below shows the upper-bound annual costs to the public purse (using lifetime costs for all those with numeracy difficulties), broken down by category.

8.10 Employment-related costs form the largest category. Costs to the education and criminal justice systems provide the next largest categories.

8.11 The cost of providing the early intervention programme used in the Every Child Counts initiative to tackle numeracy difficulties is approximately £2,500 per pupil.

8.12 Based on an assumption that the intervention will lift 79% of children who receive it out of numeracy failure, the table below shows the present value of annual savings that might be made as a result of providing numeracy intervention at the age of six to all of the 35,843 pupils per year who currently leave primary school with very low numeracy skills.

	Cost category	Total lifetime costs
Education costs	Special needs support- numeracy (primary)	£51.5m
	Special needs support-numeracy and behaviour (secondary)	£90.5m
	Cost of maintaining a Statement of special educational needs	£83.4m
	Educational psychologist time	£4.1m
	Permanent exclusions	£0.9m
	Truancy	£2.8m
	Adult numeracy classes	£2.0m
	Education total	**£235.2m**
Employment costs	Lost tax and NI revenues	£774.6m
	Unemployment benefits	£392.9m
	Lost indirect taxes	£705.2m
	Employment total	**£1,872.7m**
Social costs associated with being NEET (Not in Education, Employment or Training)	Substance abuse and teenage pregnancy	£98.9m
	Social costs	**£98.9m**
Health costs	Depression	£17.5m
	Health total	**£17.5m**
Costs of crime	Costs of involvement with criminal justice system	£164.8m
	Crime total	**£164.8m**
	TOTAL	**£2,389.1m**

£235.2m
£98.9m
£17.5m
£164.8m
£1,872.7 million

Employment £1,872.7m

Health £17.5m

Crime £164.8m

NEET £98.9m

Education £235.2m

Cost savings for all children with numeracy difficulties as a result of intervention (upper bound)

	Cost category	Total savings to age 37[1]	Total lifetime savings
Intervention	Cost of intervention	**£(89.4)m**	**£(89.4)m**
Education costs	Special needs support-numeracy (primary)	£40.7m	£40.7m
	Special needs support-numeracy and behaviour (secondary)	£71.5m	£71.5m
	Cost of maintaining a Statement of special educational needs	£65.9m	£65.9m
	Educational psychologist time	£3.2m	£3.2m
	Permanent exclusions	£0.8m	£0.8m
	Truancy	£2.2m	£2.2m
	Adult numeracy classes	£1.6m	£1.6m
	Education total	**£185.9m**	**£185.9m**
Employment costs	Lost tax and NI revenues	£381.2m	£611.9m
	Unemployment benefits	£191.3m	£310.4m
	Lost indirect taxes	£347.4m	£557.1m
	Employment total	**£919.9m**	**£1,479.4m**
Social costs associated with being NEET (Not in Education, Employment or Training)	Substance abuse and teenage pregnancy	£78.1m	£78.1m
	Social costs	**£78.1m**	**£78.1m**
Health costs	Depression	£6.9m	£13.8m
	Health total	**£6.9m**	**£13.8m**
Costs of crime	Costs of involvement with criminal justice system	£69.1m	£130.3m
	Crime total	**£69.1m**	**£130.3m**
	TOTAL	**£1,170.5m**	**£1,798.1m**

[1] To age 27 in the case of crime

8.13 The next table shows a more conservative estimate of the annual savings, using again all those with numeracy difficulties, but only those savings that fall within the moderate certainty category.

	Cost category	Total savings to age 37[2]	Total lifetime savings
Intervention	Cost of intervention	**£(89.4)m**	**£(89.4)m**
Education costs	Special needs support-numeracy (primary)	£40.7m	£40.7m
	Special needs support-numeracy and behaviour (secondary)	£71.5m	£71.5m
	Educational psychologist time	£3.2m	£3.2m
	Adult numeracy classes	£1.6m	£1.6m
	Education total	**£117.0m**	**£117.0m**
Employment costs	Lost tax and NI revenues	£381.2m	£611.9m
	Unemployment benefits	£191.3m	£310.4m
	Lost indirect taxes	£347.4m	£557.1m
	Employment total	**£919.9m**	**£1,479.4m**
Social costs associated with being NEET (Not in Education, Employment or Training)	Substance abuse and teenage pregnancy	£78.1m	£78.1m
	Social costs	**£78.1m**	**£78.1m**
Health costs	Depression	£6.9m	£13.8m
	Health total	**£6.9m**	**£13.8m**
	TOTAL	**£1,032.5m**	**£1,598.9m**

[2] To age 27 in the case of crime

8.14 Within the education category, assuming that the great majority of permanent exclusions and episodes of truancy occur in the secondary school years, the savings made in the secondary age group are very much greater than any within the primary phase. Indeed, since the full cost of providing numeracy intervention falls within the primary phase, there is no net gain to the primary school itself. Providing a child with intervention in Key Stage 1 will cost the school £2,582, considerably more than the £1,621 that we have estimated as the cost of providing that child with special educational needs support throughout Key Stage 2. This suggests that in economic terms it may be difficult to persuade primary schools to shoulder the full costs of intervention without targeted top-up funding.

8.15 The return on investment for every pound spent on the Every Child Counts programme is estimated as follows (information in the table is extracted from the more detailed table in Appendix 5):

All children with numeracy difficulties
For each of the annual 35,843 total children with numeracy difficulties

	To age 37[3]	Over a lifetime
Case 1 : Very high certainty	£1.20	£1.20
Case 2: High certainty	£4.20	£5.90
Case 3: Moderate certainty	£12.50	£18.80
Case 4: Lower certainty	£14.00	£21.10

[3] To age 27 in the case of crime

Numeracy difficulties only
For each of the 12,150 annual number of children with numeracy difficulties only

	To age 37[4]	Over a lifetime
Case 1 : Very high certainty	£1.20	£1.20
Case 2: High certainty	£4.20	£5.90
Case 3: Moderate certainty	£12.60	£19.10
Case 4: Lower certainty	£13.40	£19.80

[4] To age 27 in the case of crime

Numeracy difficulties in the context of literacy difficulties
For each of the annual 23,693 children with numeracy difficulties in the context of literacy difficulties

	To age 37[5]	Over a lifetime
Case 1 : Very high certainty	£1.20	£1.20
Case 2: High certainty	£4.20	£5.90
Case 3: Moderate certainty	£12.50	£18.80
Case 4: Lower certainty	£14.40	£21.70

[5] To age 27 in the case of crime

9. Conclusions

9.1 Costs to the public purse arising from failure to master basic numeracy skills in the primary school years, and related to all individuals with numeracy difficulties, are estimated at up to £2.4 billion every year. Costs related to individuals with numeracy difficulties only (not co-occurring with literacy difficulties) are estimated at up to £763 million each year.

9.2 We estimate that annual savings of £1.6 billion could potentially be made as a result of providing effective numeracy intervention at the age of seven to all of the 35,843 pupils who currently leave primary school each year with very low numeracy skills.

9.4 Employment-related costs form the largest category of savings. Costs to the education and criminal justice systems provide the next largest source of savings.

9.5 Within education, the costs of numeracy failure are greater in the secondary phase than in the primary phase. In economic terms, the costs to primary schools of providing intervention outweigh the benefits.

9.6 Savings estimates in this report need to be treated with caution. The life course of individuals is complex and many factors in addition to numeracy failure are likely to contribute to the negative outcomes we have examined and costed here. This means that addressing the numeracy difficulty may not always prevent these negative outcomes.

9.7 In other respects, however, the estimates in this report are conservative. They do not include savings that could not readily be quantified, such as social services and social housing costs, the costs of generally poorer health, the costs of substance abuse over the age of 18, the costs of women's involvement in the criminal justice system, the cost of homelessness, lost tax on pension income and the costs of intergenerational effects on numeracy skills. Overall, despite the caveats above, they are more likely to underestimate than overestimate the long term impact on the public purse of failure to remedy early numeracy problems.

9.8 Given the range of potential returns and the probable degree of underestimation in all of them, and avoiding any 'double counting' in relation to returns on investment for concurrent literacy difficulties, our overall judgement is that in the order of £12 to £19 will be returned for every pound spent on the Every Child Counts programme.

Appendix 1

Prevalence rates, frequency/duration and unit costs

Type of cost		Prevalence rate in total population/ those with average numeracy skills	Prevalence rate in those with poor numeracy skills	Differential prevalence	Frequency or duration	Costs
Non-Statemented special needs support linked to poor numeracy skills	Primary	0%	100%[1]	100%	Age 7 to 11	£1,586[2] for the whole of Key Stage 2 inflated to £1,621 at June 2008 prices
	Secondary				Age 11 to 16	£3,247[3] for the whole of Key Stages 3 and 4 inflated to £3,319 at June 2008 prices
Statements of special educational need		2.8%[4]	33.6%[5]	30.8%	Age 11 to 16	£1,821p.a. at 2006 prices inflated to £1,989 at 2008 prices[6]
Educational Psychologist (EP) time		EPs involved with 5% of school population[7]	EPs involved with 50% of below Level 3 population[7]	45%	Assume 3 hours on one occasion	£85 per hour EP time (2006) prices inflated to 2008 prices[7]
Permanent Exclusions		0.1% of pupils who had average or above numeracy skills were excluded in Y9[8]	0.2% of pupils who had very poor numeracy (but at least average literacy) were excluded in year 9).[8]	0.1%	Assume 1 permanent exclusion and 1 year in Pupil Referral Unit (PRU)	£1,000 per exclusion in administrative costs[9] £12,555 per annum cost of PRU less £3,000 age-weighted pupil unit (AWPU)[10] (2006 prices, inflated to 2008 prices)
Truancy		2% of secondary school population who were average or above in both numeracy and literacy at end of KS2 classed as truants[8]	5% of secondary school population who had very poor numeracy (but at least average literacy) at end of KS2 classed as truants[8]	3%	Assume one prosecution and an additional 2 hours EWO time	One prosecution £1,500 being £15/hr EWO time[11] (2003 prices: inflated to £1,830 using RPI at June 2008 prices)
Adult basic skills classes		0%	16%[12]	16%	Age 16 – 37 and 16 - 65 men, 16 - 60 women (lifetime figures)	£960 per person for entry level courses[13]

1. It has been assumed that none of the pupils lifted out of the 'very low numeracy' category will require SEN numeracy and behaviour support throughout Key Stages 2, 3 and 4

2,3. Based on 2008 survey of schools' expenditure in 7 authorities carried out by the authors and National Audit Office

4. *Special educational needs in England*, January 2007, DfES Statistical First Release

5. Primary National Strategy statistics on profile of children attaining below National Curriculum Level 3 in mathematics at the end of KS2 2006 survey of average costs of a Statement for specific learning difficulties in three local authorities

6. 2006 survey of average costs of a Statement for specific learning difficulties in three local authorities

7. Information from local authority contacts

8. Data on Y9 provided by DCSF; Y9 used as proxy for secondary age group

9. Goodall, E. *Schools Out* (2005) London: New Philanthropy Capital

10. Jackson, S. et al (2002) *The costs and benefits of educating children in care. Working paper number 4*. London: Centre for Longitudinal Studies

11. *Estimating the short and longer term costs of statutory homelessness to households and service providers* (2003) Croydon: Institute of Public Finance

12. Bynner, J. and Parsons, S. (1997) *It doesn't get any better,* Basic Skills Agency

13. Woodward, D. (2008) *Skills for Life: Progress in Improving Adult Literacy and Numeracy,* National Audit Office

Type of cost		Prevalence rate in total population/ those with average numeracy skills	Prevalence rate in those with poor numeracy skills	Differential prevalence	Frequency or duration	Costs
Employment - revenue		Men who left school at 16, and had average numeracy skills (and unknown literacy skills) had 18.9 years of full employment by age of 37[14] Women who left school at 16 and had competent numeracy and literacy had 10.22 years in full time work up to age of 29[15] Those with poor numeracy earn on average 10% less than those with good numeracy, after controlling for social class, parental interest in child's schooling, type of schools attended, educational levels[16]	Men who left school at 16, and had very low numeracy (and unknown literacy) had 15.5 years in full time work. Women who left school at 16 with poor numeracy and competent literacy had an average of 8.68 years in full time work up to age 29	Males 3.4 years of employment by the age of 37, equivalent to 7.93 years to the age of 65 Females 1.54 years of employment by the age of 37, equivalent to 3.23 years to the age of 60 (Note : figures include those with poor literacy as well as poor numeracy, so 2/5.9% has been used to derive costs for Group C) 10% earnings differential	Age 16–37 Age 16-65 men and 16–60 women (lifetime figures) Age 16–65 men Age 16–60 women	Tax and NI rate for men for the lost years of employment and earnings differential assumed to be 26.5% and for women 24.4%[17] An indirect tax rate of 32% for the lost years of employment and earnings differential for both men and women[18].

14. Bynner, J. and Parsons, S. (1997) *It doesn't get any better,* Basic Skills Agency

15. Parsons, S and Bynner, J. (2006) *Does numeracy matter more?* London: National Research and Development Centre for adult literacy and numeracy

16. Bynner, J., McIntosh, S., Vignoles, A., Dearden, L., Reed, H., Van Reenen, J. (2001) *Improving adult basic skills.* London: DfEE

17. Based on Inland Revenue data for 2003-4 for the percentage of average earnings paid in income tax and NI contributions

18. Godfrey, C., Hutton, S., Bradshaw, J., Coles, B., Craig, G. and Johnson, J. (2002) *Estimating the Cost of Being Not in Education, Employment or Training at Age 16-18*. London: DfES Research Report 346.

Type of cost		Prevalence rate in total population/ those with average numeracy skills	Prevalence rate in those with poor numeracy skills	Differential prevalence	Frequency or duration	Costs
Employment - benefits	Males only			Males 3.4 years on benefit by the age of 37, equivalent to 7.93 years to the age of 65	Age 16–37 and 16-65 (lifetime figures)	Based on average payments of Job Seeker's Allowance[19] and council tax and housing benefits[20] distributed evenly from age 16 to 37/65
Not in Education, Employment or Training (NEET) social costs		2%[21]	26%[22]	24%	Age 16-18	£6,428 (male) and £11,092 (female) at 2008 prices
Depression		10% of men and 12% of women with competent numeracy and literacy classified as depressed[23]	29% of men and 18% of women with very low numeracy but competent literacy classified as depressed[22]	19% for men 6% for women	Age 18–37 and 18-88 men, 18–92 women (lifetime figures)[24]	£194 per person p.a. (2008 prices: inflated from £125 pp p.a. at 1993 prices using RPI)[25]
Crime	Males only	27% of 30-year-old men who left school at 16, with competent numeracy and literacy, report having been arrested by police over their lifetime[26]	40% of 30-year-old men who left school at 16, with very low numeracy but competent literacy, report having been arrested by police[26]	13%	Age 11-27 (lower bound figures) and 11-65 (upper-bound figures)	£578 p.a. (1998 prices: inflated to £767 p.a.)[27]

19. DWP statistics Jobseeker's Allowance Claimants (5% sample) Weekly amount in payment (£ per week): Family Type by Income Based JSA February 2008

20. DWP statistics Housing Benefit & Council Tax Benefit Quarterly Summary Statistics: August 2007

21. Jackson, S. et al (2002) *The costs and benefits of educating children in care,* op. cit. 2% of those with 5 good GCSEs are NEET.

22. 26% of those with no A* to G GCSEs are NEET. Achieving no A* to G GCSEs has been used as a proxy for very low numeracy skills.

23. Parsons, S and Bynner, J. (2006) *Does numeracy matter more?* London: National Research and Development Centre for adult literacy and numeracy

24. ONS statistics for life expectancy

25. Feinstein, L. (2002) *Quantitative estimates of the social benefits of learning, 2: Health (Depression and obesity)* London: Centre for Research on the Wider Benefits of Learning

26. Parsons, S and Bynner, J. (2006) *Does numeracy matter more?* London: National Research and Development Centre for adult literacy and numeracy

27. Scott, S. et al (2001) *Financial cost of social exclusion*: follow up study of antisocial children into adulthood. British Medical Journal, 323. Crime costs for children (male) with conduct problems were £10,406 up to age 28

Appendix 2

Cost of SEN provision for pupils with numeracy difficulties

The seven schools chosen for this study represent a range of points on the scale of social deprivation and a range of school size

Summary: Primary (Key Stage 2)

Year Group	Total costs School A £	No. of pupils involved	Total costs School B £	No. of pupils involved	Total costs School C £	No. of pupils involved	Total costs School D £	No. of pupils involved	Total costs School E £	No. of pupils involved	Total costs Schools A,B,C,D,E £	Total numbers Schools A,B,C,D,E	Average cost per pupil £
3	410	4	73	6	4750	8	2239	4	4819	12	12,291	34	361
4	1452	10	183	4	5700	8	2239	6	4214	8	13,788	36	383
5	1368	23	730	1	5700	8	4478	10	5523	10	17,799	52	342
6	-	0	365	3	5700	5	2239	6	7706	18	16,010	32	500
										Average total cost per pupil over Key Stage 2			**1586**

Summary: Secondary

Year Group	Total costs School A £	No. of pupils involved	Total costs School B £	No. of pupils involved	Total costs Schools A and B £	Total numbers Schools A and B £	Average cost per pupil £
7	1920	8	4212	3	6132	11	557
8	1440	7	4306	4	5746	11	522
9	7440	14	2808	6	10,248	20	512
10	2520	8	2808	3	5328	11	484
11	7740	7	6324	5	14064	12	1172
				Average total cost per pupil over their secondary career			**3247**

Examples of additional provision made by primary schools for children with difficulties in mathematics

School A	Group size	Staffing costs per hour £	Hours per intervention per week	Number of pupils served in year group*	Total hours staffing per week	Weeks per year	Total annual cost £
Year 2/3							
Teaching Assistant (TA) works with group in class	4	7.2	1.5	4	1.5	38	410.40
Totals for Year 3				4			410.40
Year 4							
Higher Level Teaching Assistant (HLTA)	10	9.55	4.0	10	4.0	38	1451.60
Totals for Year 4				10			1451.60
Year 5							
TA	23	7.2	5.0 +	23	5.0 +	38	1368.00
Totals for Year 5				23			1368.00
Year 6							
No figures given							
Totals for Year 6				0			0

Number on roll: 76
Eligible for free school meals = 7.9%
Special educational needs with a Statement = 2.6%
Total special educational needs including Statements = 17.1 %

School B	Group size	Staffing costs per hour £	Hours per intervention per week	Number of pupils served in year group*	Total hours staffing per week	Weeks per year	Total annual cost £
Year 3							
TA works with a small group approx one week in four	6	9.13	1	6	1	8	73.04
Totals for Year 3				6			73.04
Year 4							
TA works with a small group each week	4	9.13	0.5	4	0.5	40	182.60
Totals for Year 4				4			182.60
Year 5							
TA works one to one twice a week with one child	1	9.13	2	1	2	40	730.40
Totals for Year 5				1			730.40
Year 6							
TA works with children below level 4 each week	3	9.13	1	3	1	40	365.20
Totals for Year 6				3			365.20

Number on roll: 196
Eligible for free school meals = 25.0%
Special educational needs with a Statement = 0.0%
Total special educational needs including Statements = 12.2%

School C	Group size	Staffing costs per hour £	Hours per intervention per week	Number of pupils served in year group*	Total hours staffing per week	Weeks per year	Total annual cost £
Year 3							
1-1 TA Support	1	10	5	1	5	38	1900
TA works with group in class	7	10	7.5	7	7.5	38	2850
Totals for Year 3				8			4750
Year 4							
1-1 TA	1	10	7.5	1	7.5	38	2850
TA Group	7	10	7.5	7	7.5	38	2850
Totals for Year 4				8			5700
Year 5							
1-1 TA Support	1	10	7.5	1	7.5	38	2850
TA Group	7	10	7.5	7	7.5	38	2850
Totals for Year 5				8			5700
Year 6							
1-1 TA Support	1	10	7.5	1	7.5	38	2850
TA Group	4	10	7.5	4	7.5	38	2850
Totals for Year 6				5			5700

Number on roll: 239
Eligible for free school meals = 2.5%
Special educational needs with a Statement = 0.8%
Total special educational needs including Statements = 5.0%

School D	Group size	Staffing costs per hour £	Hours per intervention per week	Number of pupils served in year group*	Total hours staffing per week	Weeks per year	Total annual cost £
Year 3							
Small group TA	4	11.48	5	4	5	39	2239
Totals for Year 3				4			2239
Year 4							
TA boosting	6	11.48	5	6	5	39	2239
Totals for Year 4				6			2239
Year 5							
TA boosting	6	11.48	5	6	5	39	2239
TA SEN	4	11.48	5	4	5	39	2239
Totals for Year 5				10			4478
Year 6							
TA SEN	6	11.48	5	6	5	39	2239
Totals for Year 6				6			2239

Number on roll: 242
Eligible for free school meals = 22.3%
Special educational needs with a Statement = 0.0%
Total special educational needs including Statements = 26.0%

School E	Group size	Staffing costs per hour £	Hours per intervention per week	Number of pupils served in year group*	Total hours staffing per week	Weeks per year	Total annual cost £
Year 3							
Additional support in class for target children	6	14.52	5	6	5	38	2578.80
Additional support in class for target children	6	11.79	5	6	5	38	2240.10
Totals for Year 3				20			4818.90
Year 4							
Additional support in class for target children	6	10.08	5	6	5	38	1915.20
Support in class for ST & B2	2	12.10	5	2	5	38	2299.00
Totals for Year 4				16			4214.00
Year 5							
Additional support in class for target children	6	15.15	5	6	5	38	2878.50
Support in class for ST & B2	4	13.92	5	4	5	38	2644.80
Totals for Year 5				10			5523.3
Year 6							
Additional support in class for target children	6	13.62	5	6	5	38	2587.80
Additional support in class for target children	6	13.62	5	6	5	38	2587.80
Additional support in class for target children	6	13.32	5	6	5	38	2530.80
Totals for Year 6				18			7706.00

Number on roll: 362
Eligible for free school meals = 43.2%
Special educational needs with a statement = 1.4%
Total special educational needs including statements = 28.5%

Examples of provision made by secondary schools for pupils with numeracy difficulties: School A

School A	Group size	Staffing costs per hour £	Hours per intervention per week	Number of pupils served in year group*	Total hours staffing per week	Weeks per year	Total annual cost £
Year 7							
TA works with group in class	8	12.00	4	8	4	40	1920
Totals for Year 7				8			1920
Year 8							
TA works with group in class	7	12.00	3	7	3	40	1440
Totals for Year 8				7			1440
Year 9							
TA works with group in class	12	12.00	3	12	3	40	1440
Additional teacher allowing extra set	12	15% of Annual salary of £36,000	3	(12)	3		5400
Part time Pupil Referral Unit (PRU) placements	2	15% of Annual cost of placements	3	2	3		600
Totals for Year 9				14			7440
Year 10							
TA works with group in class	6	12.00	4	6	4	40	1920
College placements/PRUs	2	15% of annual cost of placements per pupil	3	2	3	40	600
Totals for Year 10				8			2520
Year 11							
TA works with group in class	4	12.00	3	4	3	40	1440
Additional teacher allowing extra set	4	15% of annual salary of £36,000	3	(4)			5400
Additional teacher allowing extra set	3	15% of annual cost of placements per pupil	3	3			900
Totals for Year 11				7			7740

Number on roll: 713
Eligible for free school meals = 17%
Special educational needs = 21%

Note: Some pupils receive more than one provision. Where this is the case, they appear in brackets in the 'Number of pupils served in the year group' column and are counted only once in the total number of children receiving provision.
College placements and PRU placements have been costed by estimating the total percentage of time spent on the maths curriculum and taking this percentage as the costs of the placement.

Examples of provision made by secondary schools for pupils with numeracy difficulties: School B

School B	Group size	Staffing costs per hour £	Hours per intervention per week	Number of pupils served in year group*	Total hours staffing per week	Weeks per year	Total annual cost £
Year 7							
TA in-class support	1	12	3	1	3	39	1404
TA in-class support	1	12	3	1	3	39	1404
TA in-class support	1	12	3	1	3	39	1404
Totals for Year 7				3			4212
Year 8							
TA in-class support	2	12	3	2	3	39	1404
TA 1 to 1 withdrawal	1	12	3	1	3	39	1404
TA 1 to 1 withdrawal	1	12.8	3	1	3	39	1497.6
Totals for Year 8				4			4305.6
Year 9							
TA in-class support	3	12	3	3	3	39	1404
TA in-class support	2	12	3	2	3	39	1404
Totals for Year 9				5			2808
Year 10							
TA in-class support	2	12	3	2	3	39	1404
TA 1 to 1 withdrawal	1	12	3	1	3	39	1404
Totals for Year 10				3			2808
Year 11							
SENCO withdrawal class with HLTA support	5	52	3	5	3	39	6084
LIFESKILLS numeracy with 2 HLTA	5	30	2	5	2	4	240
Totals for Year 11				5			6324

Number on roll: 980
Eligible for free school meals = 3%
Special educational needs = 10%

Appendix 3

Costs of intensive early numeracy intervention

Table 1: Costs at local authority (LA) level over five years, including year of training:

Item	Start up costs	£	£	£
1	Essential: Training course	4,000		
	Teacher Leader's time during full time participation in training course (salary @£45K plus 23% on-costs)	55,350	59,350	
2	Maths resources for training centre	1,000		
3	Start up costs		60,350	**60,350**
4	**Running costs**			
5	Teacher Leader's (TL) time = £55,350 per year over four years	221,400		
6	Service Level Agreement with Higher Education Institution (quality assurance and ongoing professional development) @ £4,000 per year for one year then £2,000 per year for three years	10,000		
7	Total running costs over next four years			231,400
8	Gross costs for LA over five years			291,750 less
9	Income from schools for teacher training @ £2,500 per school x 44 schools	110,000	110,000	110,000
10	**Net costs for LA over five years**			**181,750**

Table 2: Costs at school level over four years:

Item	Start up costs	£	£	£
11	Essential: Training course	2,500		
12	May be needed: Maths resources	1,000		
13	Maximum start-up costs		3,500	
14	Running costs			
15	0.5 teacher time for 1-1 teaching = £20,000 per year over four years	80,000	80,000	
16	Total cost to the school over four years			83,500
17	8 - 10 children served per 0.5 teacher time per year, average 9 children per year x 4yrs = 36 children			÷36
18	Cost to the school per child			2,319

Table 3: Combined school and LA costs per child

Item	Start up costs	£	£	£
19	LA costs per child (Net costs ÷ number children served over 5 years)	181,750÷ 1,010	180	
20	School costs per child		2,319	
21	Total cost per child		£2,499	£2,499

Appendix 4

Methodology

Special needs support

Special educational needs (SEN) costs to education were derived from information on the actual 2008 costs of providing SEN support in a sample of schools in seven different local authorities. The schools were chosen to represent a range of social deprivation.

SEN costs of providing numeracy support for pupils entering KS1 below L2, or KS3 below L3 in maths (En level not known) averaged out at £1,621 per pupil for the total Key Stage 2 phase (4 years, age 7-11) and £3,319 (indexed to 2008 prices) per pupil for the total Key Stage 3 and 4 phases (5 years, age 11-16).

It was assumed that without numeracy intervention 100% of 35,843 children (the 2005 number of children with very low numeracy skills, who left primary school below L3 in mathematics) would receive SEN support for numeracy.

79% of these (28,316) can be assumed to escape the need for SEN support because early numeracy intervention has successfully lifted them out of very low numeracy levels[28].

Savings would therefore be 28,316 x £1,621, spread evenly over the ages 7-11, and 28,316 x £3,319, spread evenly over the ages 11-16.

Of these costs, 2/5.9 x 100 (33.9%) can be assumed to relate to pupils with numeracy difficulties but adequate literacy (Group C).

3.9/5.9 x 100 (66.1%) can be assumed to relate to pupils with both numeracy and literacy difficulties (Group B).

It was assumed that 50% of the 35,843 with very low numeracy skills would have input from an educational psychologist, compared to 5% of children with no numeracy problems. The differential usage is therefore 45%.

Applying this figure of 45% to the year group population of 35,843 gives 16,129 more children with very poor numeracy skills who can be expected to have input from an educational psychologist than would be expected if they were average in maths.

79% of these (12,742) can be assumed to escape the need for EP input because early numeracy intervention has successfully lifted them out of very low numeracy levels.

The costs of educational psychologist input were estimated as £279, being 3 hours input at £85 per hour inflated to 2008 prices.

Savings on educational psychologist input would therefore be 12,742 x £279. These savings were assumed to occur on one occasion and were arbitrarily located in school Year 4 (age 9).

Of these costs, 2/5.9 x 100 (33.9%) were apportioned to numeracy difficulties only (Group C) and 3.9/5.9 x 100 (66.1%) to numeracy and literacy difficulties (Group B).

It was additionally assumed that 33.6% of children with very low numeracy skills would have a Statement of special educational need, compared to 2.8% of the total population. The differential prevalence is therefore 30.8%. Applying this figure of 30.8% to the year group population of gives 11,040 more children with very poor numeracy skills who can be expected to have a Statement than would be expected if they were average at maths.

79% of these (8,721) can be assumed to escape the need for a Statement because early numeracy intervention has successfully lifted them out of very low numeracy levels. The annual cost of maintaining a Statement for specific learning difficulties was estimated at £1,989 (indexed to 2008 prices) per pupil. Savings on Statements would therefore be 8,721 x £1,989 in each year between the ages of 11 and 16.

Of these costs, 33.9% were apportioned to numeracy difficulties only (Group C) and 66.1% to numeracy and literacy difficulties (Group B).

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28. The figure of 79% is an approximation based on 83% of children involved in Numeracy Recovery in Hackney being returned to average or above average levels for their age, reduced to represent a figure more likely to be achieved in a larger-scale and less well supported implementation.

Truancy

5% of the secondary school population who entered secondary school with very poor numeracy (but at least average literacy) are classified as truants (having 12 or more half-days of unauthorised absence per term) compared to 2% of the secondary school population who were average or above in both numeracy and literacy at entry. The differential frequency is therefore 3%.

Applying this figure of 3% to the numeracy-difficulties-only year group population of 12,150 (Group C) gives 364 more pupils with very poor numeracy skills who can be expected to be truants than would be expected if they were average at maths.

79% of these (288) can be assumed to escape truancy because early numeracy intervention has successfully lifted them out of very low numeracy levels.

The costs of truancy were identified as £1,830 per episode of truancy (£1,500 for one prosecution, plus two hours (at £15 per hour) of Education Welfare Officer time, inflated to 2008 prices).

We assumed one episode of truancy and located a one-off cost of 288 x £1,830 arbitrarily at the age of 14 for Group C.

Costs for Group B were calculated as 3.9/6.3 x 100 (61.9%) of the costs calculated in the *Long term costs of literacy difficulties* report.

Exclusion

0.2% of Y9 pupils who entered secondary school with very low numeracy (but at least average literacy) are permanently excluded from school compared to 0.1% of the pupils entering with average or above average numeracy skills. The differential frequency is therefore 0.1%.

Applying this figure of 0.1% to the numeracy-difficulties-only year group population of 12,150 (Group C) gives 12.1 more pupils with very poor numeracy skills who can be expected to be excluded than would be expected if they were average at maths.

79% of these (9.6) can be assumed to escape exclusion because early numeracy intervention has successfully lifted them out of very low numeracy levels.

The costs of exclusion were identified as £11,528 per episode (£1,000 to administer the exclusion and one year in a pupil referral unit, at a cost of £12,555, less the Age-Weighted Pupil Unit (AWPU) that would otherwise have been spent on the pupil – approximately £3,000, inflated to 2008 prices).

We assumed a frequency of one permanent exclusion and located a one-off cost of 9.6 x £11,528 arbitrarily at the age of 14.

Costs for Group B were calculated as 3.9/6.3 x 100 (61.9%) of the costs calculated in the *Long term costs of literacy difficulties* report.

Adult numeracy classes

Men and women leaving school with very low levels of literacy and numeracy can be expected to receive support under the Skills for Life program. The take-up rate for numeracy courses is 16% of those with self-reported numeracy difficulties. Applying this figure of 16% to the male numeracy-difficulties-only year group population of 4,824 (Group C) gives 772 more pupils with very poor numeracy skills who can be expected to undertake these courses than would be expected if they were average at maths. 79% of these (610) can be assumed to escape the need for these courses because early numeracy intervention has successfully lifted them out of very low numeracy levels.

Similarly, applying this figure of 16% to the female numeracy-difficulties-only year group population of 7,326 (Group C) gives 1,172 more pupils with very poor numeracy skills who can be expected to undertake these courses. 79% of these (926) can be assumed to escape the need for these courses because early numeracy intervention has successfully lifted them out of very low numeracy levels.

The average costs of providing entry level literacy and numeracy courses are £960 per person. We therefore arrived at savings of 610 x £960 for men and 926 x £960 for women and spread these evenly over the ages of 16-65 for men and 16-60 for women.

Costs for Group B were calculated using the same methodology as applied to the population figures in the Long term costs of literacy difficulties report, and 3.9/6.3 x 100 (61.9%) of the costs included.

Employment costs – direct tax, NI and indirect tax and benefits

Men with very low numeracy levels (and unknown literacy, therefore representing Groups B plus C) who left school at 16 have 3.4 years' less employment by the age of 37 than men who left school at 16 with average numeracy skills. This equates to a differential of 7.93 years of unemployment by the age of 65.

We assumed that for males, 79% of those in the 19,686 Group B plus C total year group population would escape this 7.93 year employment differential. We assumed remuneration at the average rate of £20,488 for women (from the Office for National Statistics, 2007 Annual Survey of Hours and Earnings, indexed using an earnings index to £21,936 at 2008 prices), and £25,896 for men (indexed to £27,727 at 2008 prices). We assumed direct tax and NI rates at the average rate of 26.5% for men and 24.4% for women (HM Treasury 2003-4). From this we arrived at a sum for differential direct tax and NI. We spread this evenly over the 21 (to age 37 figures) and 49 year earnings period (lifetime figures) from the age of 16 to the age of 37 and 65.

For women, the equivalent differential in years of employment between those with very low and those with average numeracy skills is 1.54 years to the age of 37, giving a 3.23 year differential to the age of 60. We assumed that 12,764 females, 79% of those in the 16,157 Group B plus C total year group population, would escape this 3.23 year employment differential, and used this to calculate and spread a sum for differential direct tax and NI, in the same way as for men.

We also used the differential years of employment to calculate lost indirect taxes. We assumed an indirect tax rate of 32% for both men and women (taken from the Office for National Statistics, Social Trends 2001 report, being the indirect taxes as a percentage of disposable income for the bottom quintile of household income). We applied this to the additional disposable income (income less direct tax and NI contributions) and spread this evenly over the relevant period of employment for men and women.

We assumed that males not in employment for 7.93 years (the differential period) would be in receipt of Job Seeker's Allowance and other benefits. An average weekly Job Seeker's Allowance paid to the male members of different family types was calculated as £50. In addition, average weekly payments of housing benefit and council tax benefit were included. In total, these give an annual unemployment benefits cost of £7,291 at 2008 prices.

The costs of unemployment benefits were spread evenly over the 21 and 49 year earnings period from the age of 16 to the age of 37 and 65.

As for lost tax and NI revenues, we calculated a sum for the 7.93 years differential and spread it evenly over the 21 and 49 year earnings period.

The equivalent calculation was not undertaken for females, as it was considered less certain that when not employed they would be claiming Job Seekers' Allowance.

Of these costs, 33.9% were apportioned to numeracy difficulties only (Group C) and 66.1% to numeracy and literacy difficulties (Group B).

Earnings premium

For both men and women, having poor numeracy skills (and unknown literacy, therefore representing Groups B plus C) attracts a 10% average earnings reduction when compared to those with good numeracy, after controlling for social class and educational levels. We assumed that for males, 79% of those in the 19,686 Group B plus C total year group population would escape this earnings reduction, and 12,764 females, 79% of those in the 16,157 Group B plus C total year group population. After removing the average time spent out of employment (7.2 years for men and 22.6 years for women (the average years out of employment to the age of 37, pro-rated over the entire earnings period for men and women), we calculated the direct tax and NI and indirect tax lost as a result of lower earnings to 37 and to retirement age, using the average earnings and tax/NI rates as above.

Of these costs, 33.9% were apportioned to numeracy difficulties only (Group C) and 66.1% to numeracy and literacy difficulties (Group B).

NEET costs

We assumed that 2% of those with average numeracy skills are NEET at ages 16-18, compared to 26% of those with very low numeracy skills. The differential frequency is therefore 24%.

Applying this figure of 24% to the 16,157 females in the Group B and C year group population of 35,843 gives 3,878 more women with very poor numeracy skills who can be expected to be NEET than would be expected if they were average at maths

79% of these (3,063 women) can be assumed to escape being NEET because early numeracy intervention has successfully lifted them out of very low numeracy levels.

Applying the 24% differential to the 19,686 males in the Group B and C year group population gives 4,725 more men with very poor numeracy skills who can be expected to be NEET than would be expected if they were average at maths.

79% of these men (3,732) can be assumed to escape being NEET because early numeracy intervention has successfully lifted them out of very low numeracy levels.

The social costs incurred by this group (poor health, substance abuse and teenage pregnancy) were identified as £11,092 per female NEET and £6,428 per male NEET. We therefore arrived at savings of 3,063 x £11,092 for women and 3,732 x £6,428 for men and spread these evenly over the 16-18 ages.

Of these costs, 33.9% were apportioned to numeracy difficulties only (Group C) and 66.1% to numeracy and literacy difficulties (Group B).

Depression

29% of men and 18% of women with very low numeracy but competent literacy are classified as depressed compared to 10% of men and 12% of women with competent numeracy and literacy.

The differential frequency is therefore 19% for men and 6% for women.

Applying this figure of 6% to the 7,326 females in the Group C year group population gives 440 more women with very poor numeracy skills who can be expected to experience depression than would be expected if they were average at maths.

79% of these (347 women) can be assumed to escape depression because early numeracy intervention has successfully lifted them out of very low numeracy levels.

The costs of depression were identified as £194 (inflated to 2008 prices) per year per depressed person.

We assumed that the differential rate of depression applies for adult life, and cannot be limited to a particular age range, so those with poorer numeracy levels will be more likely to experience depression whatever their age. The average life expectation for women is 92 (from the Office for National Statistics, being the life expectancy for children born in 2006, published February 2008). This figure was used to arrive at lifetime total cost savings for depression for the identified female subjects, with age 37 used for the lower bound totals.

The same process was used to calculate costs for men, using a differential frequency rate of 19%. Applying this differential to 4,824 Group C males gives 917 more men with very poor numeracy skills who can be expected to experience depression than would be expected if they were average at maths.

79% of these (724) can be assumed to escape depression because of early numeracy intervention.

An average life expectancy of 88 for men was used to arrive at lifetime total cost savings for depression for these identified male subjects, with age 37 used for the lower bound totals.

Costs for Group B were calculated as 3.9/6.3 x 100 (61.9%) of the costs calculated in the *Long term costs of literacy difficulties* report.

Crime

27% of 30-year-old men with competent numeracy and literacy report having been arrested by police over their lifetime. 40% of 30-year-old men with very low numeracy but competent literacy report having been arrested by police. The differential frequency is therefore 13%. Applying this figure of 13% to the 4,824 males in the Group C year group population gives 627 more men with very poor numeracy skills who can be expected to have an involvement with the criminal justice system than would be expected if they were average at maths.

79% of these males (495) can be assumed to escape involvement with the criminal justice system because early numeracy intervention has successfully lifted them out of very low numeracy levels.

We used a cost figure of £13,807 (inflated to 2008 prices) for involvement in the criminal justice system (drawn from an empirical study that actually followed up boys who had conduct problems at age 10 to the age of 27, and arrived at the actual costs of court appearances, probation, placement in a young offenders' institution or prison). This gives an annual cost of crime of £767.

We then multiplied this figure by 495 and spread the resulting savings evenly over ages 10-27 (lower bound figure) and 10-65 (lifetime figure).

Costs for Group B were calculated as 3.9/6.3 x 100 (61.9%) of the costs calculated in the *Long term costs of literacy difficulties* report.

We were not able to estimate costs for females as no comparable empirical data was available. This means that the estimated costs of crime are conservative, since there is a very strong empirical link between poor numeracy in females and their involvement in crime, even when other potentially contributory factors such as social class and educational levels are controlled for.

Net Present Value

All costs and savings have been adjusted using a 'net present value' (NPV) calculation. This calculation adjusts costs and benefits to a common point in time.

Net present value (NPV) is a calculation used to estimate the value – or net benefit – over the lifetime of a particular project, such as building a new town hall or installing energy efficient appliances. NPV allows decision makers to compare various alternatives on a similar time scale by converting all options to current £ figures. This adjusts for the time value of money.

The premise of the time value of money is that an investor prefers to receive money today, rather than the same amount in the future, all else being equal. Money received now can be invested to generate a greater return than the same cash sum received in the future. As a result, the investor demands an increased sum in the future to compensate for interest lost.

For example, with an interest rate of 3.5% the sum of £100 paid or received now is equivalent to £103.50 received in one year's time. Conversely, £103.50 paid or received in one year has a **present value** of £100.

The interest rate used to discount future cash flows to their present values is a key input of this assessment process. In this evaluation we have used a discount (interest) rate of 3.5% for the first 30 years, and 3.0% thereafter, which is the current Treasury "Test Discount Rate".

Degree of certainty

Costs are presented as four cases, by degree of certainty that remediating the numeracy difficulty will prevent a particular long term cost.

Case 1: Very high certainty	The long term cost is a direct consequence of the numeracy difficulty	SEN support in Key Stage 2 SEN support in Key Stage 3 and 4 Adult basic skills classes	SEN support and attending adult basic skills classes are a direct consequence of numeracy difficulties not addressed by the age of 7, and early effective remediation would prevent this cost
Case 2: High certainty	The long term cost is a direct consequence of the numeracy difficulty, but specific factors produce some variability in the probability that it will be incurred, or	Educational psychologist time	Direct consequence – but dependent on availability of EP time, which varies across the country
	Data have been taken from studies which control for a large number of co-occurring factors that might otherwise explain the link between the numeracy difficulty and the long term outcome/cost	Earnings premium	Earnings premium used is that reported after controlling for social class, early cognitive ability, home support for learning and a range of other factors that might explain the link between higher earnings and numeracy levels at and above Level 1
Case 3: Moderate certainty	Data have been taken from studies which control for some co-occurring factors that might otherwise explain the link between the numeracy difficulty and the long term outcome/cost	Truancy Exclusions	Differential exclusion and truancy figures compare pupils with good numeracy/good literacy with pupils with poor numeracy/good literacy – thus controlling for some factors (such as general cognitive ability, social class) that might explain the link
		Unemployment Depression	Differential figures are based only on those leaving school at 16, thus controlling for some factors (such as qualifications levels) that might explain the link
		NEET costs	Strong statistical link between low numeracy and NEET status but causality cannot be proved
		Crime	Differentials in arrests compare adults with good numeracy/good literacy with those with poor numeracy/good literacy – thus controlling for some factors (such as general cognitive ability, social class) that might explain the link
Case 4: Lower certainty	The long term cost is a direct consequence of the numeracy difficulty, but specific factors produce a large amount of variability in the probability that it will be incurred, or Data have been taken from studies which do not control for co-occurring factors that might otherwise explain the link between the numeracy difficulty and the outcome/cost	Statement costs	Direct consequence – but dependent on local policies, which vary widely across the country

Numeracy difficulties in the context of concurrent literacy difficulties

Case 1: Very high certainty	The long term cost is a direct consequence of the numeracy difficulty	SEN support in Key Stage 2 SEN support in Key Stage 3 and 4 Adult basic skills classes	SEN support and attending adult basic skills classes are a direct consequence of literacy and numeracy difficulties not addressed by the age of 7
Case 2: High certainty	The long term cost is a direct consequence of the numeracy difficulty, but specific factors produce some variability in the probability that it will be incurred, or	Educational psychologist time	Direct consequence – but dependent on availability of EP time, which varies across the country
	Data have been taken from studies which control for a large number of co-occurring factors that might otherwise explain the link between the numeracy difficulty and the long term outcome/cost	Earnings premium	Earnings premium used is that reported after controlling for social class, early cognitive ability, home support for learning and a range of other factors that might explain the link between higher earnings and literacy/numeracy levels at and above Level 1
Case 3: Moderate certainty	Data have been taken from studies which control for some co-occurring factors that might otherwise explain the link between the numeracy difficulty and the long term outcome/cost	Unemployment Depression	Differential figures based only on those leaving school at 16, thus controlling for some factors (such as qualifications levels) that might explain the link with low literacy and numeracy
		NEET	Strong statistical link between low literacy and numeracy and NEET status, but causality cannot be proved
Case 4: Lower certainty	The long term cost is a direct consequence of the numeracy difficulty, but specific factors produce a large amount of variability in the probability that it will be incurred, or	Statement costs	Direct consequence – but dependent on local policies, which vary widely across the country
	Data have been taken from studies which do not control for co-occurring factors that might otherwise explain the link between the numeracy difficulty and the outcome/cost	Truancy Exclusions	Differential exclusion and truancy figures compare pupils with good literacy skills with pupils with poor literacy skills (but unknown numeracy skills) – thus not controlling for factors (such as general cognitive ability, social class) that might explain the link
		Crime	Differentials based on empirical data on % of children with literacy difficulties who also have behaviour problems (and empirical data about costs of behaviour problems to criminal justice system, but no controls for other factors (such as general cognitive ability, social class) that might explain the link

Appendix 5

A financial assessment of the costs and benefits of numeracy intervention
Group B Numeracy difficulties co-occurring with literacy difficulties

Very high certainty

	To age 37 £	Lifetime £
Costs of SEN Support KS2	26.9	26.9
Costs of SEN Support KS3	47.2	47.2
Costs of Adult basic skills classes	1.2	1.2
	75.3	75.3
For every £1 spent on intervention	£ 1.20	£ 1.20
		Is saved in today's money

High certainty

	To age 37	Lifetime
Costs of Educational psychologist time	2.1	2.1
Costs of Earnings premium	172.3	276.2
	249.7	353.6
For every £1 spent on intervention	£ 3.90	£ 5.60
		Is saved in today's money

Moderate certainty

	To age 37	Lifetime
Costs of Unemployment - tax loss	309.3	496.6
Costs of Unemployment - benefits	126.4	205.2
Costs of Depression	5.0	10.1
Costs of NEET	51.6	51.6
	742.0	1,117.1
For every £1 spent on intervention	£ 11.80	£ 17.80
		Is saved in today's money

Lower certainty

	To age 37	Lifetime
Statement costs	43.6	43.6
Costs of Truancy	1.8	1.8
Costs of Exclusions	0.7	0.7
Costs of Crime	64.6	121.8
	852.7	1,285.0
For every £1 spent on intervention	£ 13.60	£ 20.50
		Is saved in today's money

Very high certainty

	To age 37	Lifetime
	£	£
Costs of SEN Support KS2	13.8	13.8
Costs of SEN Support KS3	24.2	24.2
Costs of Adult basic skills classes	0.4	0.4
	38.4	38.4
For every £1 spent on intervention	£ 1.20	£ 1.20

Is saved in today's money

High certainty

	To age 37	Lifetime
Costs of Educational psychologist time	1.1	1.1
Costs of Earnings premium	88.4	141.6
	127.9	181.1
For every £1 spent on intervention	£ 3.90	£ 5.60

Is saved in today's money

Moderate certainty

	To age 37	Lifetime
Costs of Truancy	0.4	0.4
Costs of Exclusions	0.1	0.1
Costs of Unemployment - tax loss	158.6	254.7
Costs of Unemployment - benefits	64.8	105.2
Costs of Depression	1.9	3.7
Costs of NEET	26.5	26.5
Costs of Crime	4.5	8.5
	384.7	580.2
For every £1 spent on intervention	£ 12.00	£ 18.10

Is saved in today's money

Lower certainty

	To age 37	Lifetime
Statement costs	22.4	22.4
	407.1	602.6
For every £1 spent on intervention	£ 12.70	£ 18.80

Is saved in today's money

Groups B + C All those with numeracy difficulties

Very high certainty

	To age 37		Lifetime
	£		£
Costs of SEN Support KS2	40.7		40.7
Costs of SEN Support KS3	71.5		71.5
Costs of Adult basic skills classes	1.6		1.6
	113.8		113.8

For every £1 spent on intervention	£	**1.20**	£	**1.20**

Is saved in today's money

High certainty

	To age 37		Lifetime
Costs of Educational psychologist time	3.2		3.2
Costs of Earnings premium	260.7		417.8
	377.7		534.8

For every £1 spent on intervention	£	**3.90**	£	**5.60**

Is saved in today's money

Moderate certainty

	To age 37		Lifetime
Costs of Unemployment - tax loss	467.9		751.2
Costs of Unemployment - benefits	191.2		310.4
Costs of Depression	6.9		13.8
Costs of NEET	78.1		78.1
	1,121.8		1,688.3

For every £1 spent on intervention	£	**11.80**	£	**17.80**

Is saved in today's money

Lower certainty

	To age 37		Lifetime
Statement costs	65.9		65.9
Costs of Truancy	2.2		2.2
Costs of Exclusions	0.7		0.7
Costs of Crime	69.1		130.3
	1,259.7		1,887.4

For every £1 spent on intervention	£	**13.30**	£	**19.90**

Is saved in today's money

Appendix 6

Authors

This report was prepared by Jean Gross, formerly Director of Every Child a Reader and now of the Every Child a Chance Trust, and members of the KPMG Infrastructure, Government and Healthcare (IGH) Advisory team.

The IGH Advisory Team includes education and IT specialists. The team has a broad range of experience in the education sector, ranging from senior management experience in schools to senior management experience in colleges, universities and funding bodies such as the Learning and Skills Council. Their experience includes curriculum, finance, estates and student data issues. The team covers a wide range of assignments, from assisting individual providers with significant projects such as merger or estates strategies through to larger-scale reviews for the Department for Children, Schools and Families, the Department for Innovation, Universities and Skills, the Learning and Skills Council or the Learning and Skills Improvement Service.

The project team for this report included:

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Jean Gross

Jean is the Director of Every Child a Chance Trust, which aims to bring together the interests of the business, charitable and public sectors in tackling social exclusion through high-impact early intervention programmes such as Every Child Counts and Every Child a Reader. She previously worked for the government's National Numeracy Strategy and was Senior Director within the Primary National Strategy, responsible for its work on overcoming barriers to learning and achievement. A former teacher, university lecturer, educational psychologist and Head of Children's Services in a large urban local authority, Jean is a national expert on barriers to learning and how to overcome them. She is a Visiting Fellow at the London University Institute of Education and the author of numerous research articles and books on children's issues including Psychology and Parenthood (Open University Press), Special educational needs in the primary school: a practical guide (Open University Press), Special educational needs and school improvement (David Fulton), and Beating Bureaucracy in Special Educational Needs (Routledge).

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