



A new approach to making the UK numerate



The people featured throughout this report have all achieved the Essentials of Numeracy using the National Numeracy Challenge

“Getting the Essentials of Numeracy has enhanced my self-belief in my role at work.”

Ramesh Ranis

Foreword



Poor numeracy poses a financial cost to the individual and a cost to the economy, estimated to be £20 billion a

year. There are simply too many adults in the UK who, through no fault of their own, lack the basic numeracy skills needed in everyday work and life. This is a waste of human and economic capital that we simply can't ignore.

We have seen a keen and growing focus on improving maths in schools but many of the 17 million adults with poor numeracy are now out of reach of the education system, meaning employers must play their part too. Businesses have a vital role to play in helping the millions of adults held back by a lack of basic numeracy. All of us have relationships with our employees, with our suppliers, and within our business networks that we can use to help those who need it most to improve their basic skills.

The UK is one of the least socially mobile countries in the world and sustained and collaborative action is needed to ensure that everyone, regardless of background, can fulfil their potential. But improving numeracy levels is important not just because it is 'the right thing to do'. It also makes good business sense. It is increasingly clear that a highly skilled workforce will be vital to the success of

our future economy. If we are to solve the UK's long-standing productivity puzzle, improving basic skills in the workforce will be a key challenge for the business community to tackle.

KPMG has a long history of working with disadvantaged young people to improve their basic skills. The KPMG Foundation, which is committed to helping children from the most challenging socio-economic backgrounds, reached over 50,000 six-year-olds with its Every Child Counts and Every Child a Reader programmes. We are committed to broadening the scope of our efforts to those adults who are equally held back by poor numeracy and literacy skills, many of whom have long careers ahead of them.

We are supporting National Numeracy because we believe it can generate a fundamental shift in attitude and attainment in numeracy in the UK. With the Essentials of Numeracy, National Numeracy identifies the skills everybody needs on a daily basis and provides effective, accessible and scalable tools for people to use. But it's clear that no single initiative will be able to solve this problem alone. Business, policymakers, educationalists and indeed society as a whole must all pull together to ensure that everyone has the essential numeracy skills they need to succeed.

**Melanie Richards,
Vice Chair, KPMG in the UK**

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Summary

Poor numeracy remains endemic in the UK. Government statistics suggest that 17 million adults – 49% of the working-age population of England – have the numeracy level that we expect of primary school children. The total cost to the UK economy (to the Exchequer, employers and individuals) has been put at £20 billion a year. Within this, the average cost to individuals with poor numeracy is £460 a year. It affects not only people's pockets, but their health and wellbeing too. And it is a major, and often unrecognised, drain on workplace productivity.

The importance of good numeracy is widely acknowledged at a top level by economists and educationalists. And yet on the ground the problem continues. Poor numeracy among individuals is often not detected and the impact on productivity within a particular workplace is not quantified. Numeracy – the ability to solve everyday problems through the application of basic mathematical skills and understanding – is often overshadowed by concerns about literacy and subsumed in academic mathematics. And yet it is different from both. It also continues to be beset by cultural barriers – the social acceptability of saying 'I'm rubbish at maths' and the mistaken view that maths is a can-do/can't-do subject.

The resolution of all this cannot be left to the education and skills system alone. It is not solely a matter of ensuring students leave school numerate, important though that is. Help must also be directed to the millions of barely numerate adults already at work, many of whom will continue to work for several decades.

Solutions are not easy, but we offer an approach which we have shown can have real impact if supported by employers, policy-makers and others. We have identified the essential numerical skills and understanding that everyone needs and that can be adapted to all everyday contexts: we call these the Essentials of Numeracy. We have also devised low-cost methods for assessing whether people have the Essentials and, if not, helping them get there, and for embedding the approach within workplaces and other organisations. All of this is underpinned by our belief, backed by evidence, that virtually everyone can improve with effort and the right support.

This may be an old problem, but in the current economic climate, it is more crucial than ever. As a small charity, National Numeracy cannot act alone but we now have concrete, low-cost, solutions to enable almost everyone to get the Essentials of Numeracy. We therefore call on all those with an interest in the economic and educational success of the UK to join and support us in the drive to do something effective – at long last – about improving numeracy.

49%

49% of the working-age population of England have the numeracy level that we expect of primary school children.

£20bn

The total cost to the UK economy (to the Exchequer, employers and individuals) has been put at £20 billion a year.

Specifically, we call upon:

Government to turn its attention to improving the skills of the 'forgotten half' of adults whose primary school level numeracy is holding back both them and the country – rather than focusing solely on qualifications for children, young people and a limited number of adults. We propose an efficient, cost-effective way of identifying and addressing poor numeracy across the workforce. This could provide a much-needed spur to post-Brexit productivity and should be a key part of a modern industrial strategy.

Employers to recognise that some of the many millions of adults who struggle with numeracy may be in their own workplace – and that this has a negative impact on business productivity. We invite firms to work with us to support their employees who need to get the Essentials of Numeracy.

Workplace training providers to work with us to address 'I can't do maths', which is the first and perhaps most significant barrier to people improving their numeracy. In doing so, there is an opportunity to improve engagement, retention and the long-term impact of current skills training.

Individuals to 'just do it'. Everyone can check whether they've got the Essentials of Numeracy and if they are not there yet, then we can help them.

“

My recent work reviewing Post-16 mathematics education for the government has surfaced a number of wider issues, including the remarkable statistic that approximately half the adult population have the number skills that we expect of an 11 year old.”

”

**Sir Adrian Smith,
Vice-Chancellor,
University of
London**

Numeracy in the UK: the story so far

You are paid £9/hour and receive a 5% pay rise. What is your new rate of pay? This is a simple enough question: one that every adult should be able to work out the answer to, whether in their heads, with pencil and paper or with help from the calculator on their phones. We could give many other similar examples, of ordinary, everyday maths that people need to be able to do. They need to do it to get by in life and to get on in life. They also need to do it for the sake of the future prosperity of the UK.

We are yet to find anyone in a position of influence who disagrees with this. It is not controversial. However, whereas substantial progress has been made on adult literacy, we are still failing to create a numerate population (see figure 1). In a recent survey, almost a quarter of adults across the UK were unable to answer the above question correctly (even with the option of using a calculator)¹. Independent economic research suggests that the direct cost of this poor numeracy to these individuals averages **£460 every year**².



What do we mean by numeracy?

Being confident and competent to use numbers and data to make good decisions in daily life.

What is going wrong? The answer is of course multi-faceted but we believe that one vital missing element is a clear understanding of what it really means to be numerate: having the mathematical skills and understanding that enable people to tackle simple problems and make good decisions. We call these skills the Essentials of Numeracy.

What has also been missing until now is an easy, scalable way to identify, assess and address poor numeracy, equipping everyone with the Essentials. Our work in job centres, in universities and with employers suggests that poor literacy is easy to identify and difficult to hide (being asked to fill in a form gives an instant indication) whereas staff tell us that poor numeracy is currently difficult to identify and easy to hide.



I make no secret of the fact that I love maths but I also know not everyone is like me... But there is some maths that everyone really does need a grasp of to make good, informed decisions both at home and at work.



**Rachel Riley,
TV Presenter &
Mathematician**

¹ YouGov June 2017. 23% of respondents answered incorrectly or 'don't know'. Three everyday maths questions were asked and 5 out of 6 respondents (83%) failed to answer all three correctly.

² Derived from PBE (2014) using 2012 population data and subsequent inflation. £460 is the mid estimate with a range from £146 to £742. Further explanation on the following page.

This is about more than being able to ‘do sums’. When almost everyone carries more computing power in their pocket than it took to put a man on the moon, that should be self-evident. It is also about more than having exam passes. If someone can’t work out what difference a 5% pay increase makes, even with their phone and a GCSE certificate, then how do we best help them?

So far the education and skills system is yet to make a significant impression on the stagnating numeracy levels among adults. Regardless of what happens in schools and colleges – and there *are* key implications there too – we need to address the problem of poor maths skills among millions of people already of working age. We cannot simply hope that schools and colleges provide answers for the future. In this report, we explore why the situation remains as it is and propose an alternative approach based upon our work with partner organisations. This has shown that a rapid improvement in adult numeracy is possible and is scalable at a cost per learner that is far lower than other current approaches³.

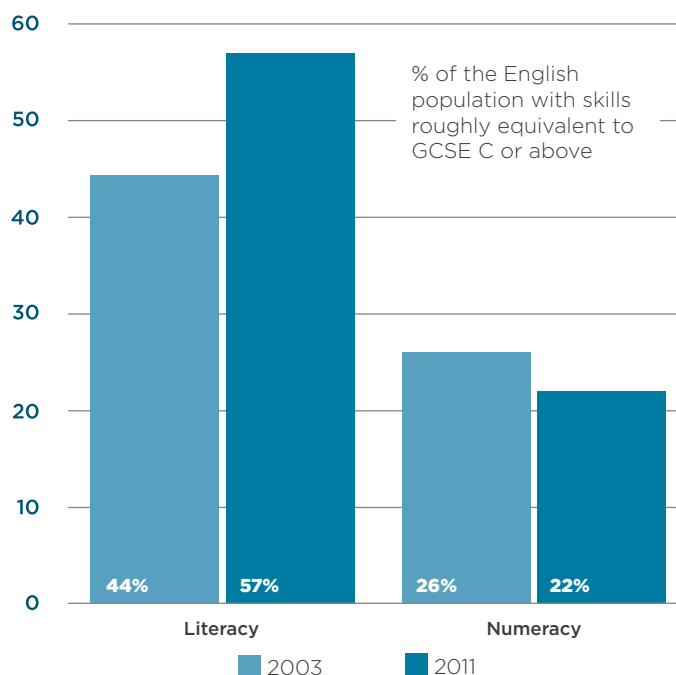


Figure 1: A comparison between numeracy and literacy skills. Data from Department for Business, Innovation and Skills, 2012. “Skills for Life Survey 2011”. These findings are for England. Other research suggests a somewhat similar picture for other parts of the UK.

³ National Numeracy Challenge cost per improver in 2016 was £74. The Skills Funding Agency pay providers a standard rate of £724 per Functional Skills qualification (with no evidence of how much learners have progressed or improved through taking the qualification)

The story so far: some facts. The evidence to suggest that many adults in the UK are not numerate has been amassing in recent years. There are no signs of improvement and at points in our recent history numeracy levels appear to have actually declined.

The UK was the worst performing of the 17 OECD countries in the 'Numeracy / Knowledge' component of Adult Financial Literacy⁴.

78%

78% of adults have numeracy skills below Level 2 (the same level as a good GCSE pass) and would therefore struggle to correctly answer a question such as 'A TV has been reduced by 20% and now costs £280. What was the original price?'⁵.

Less than 1/4

Of those 16-24 year olds with a grade C or above in GCSE maths, less than a quarter were at an equivalent level when their numeracy was tested⁶ - suggesting that GCSE is no guarantee of good numeracy.

National Numeracy's individual workplace reviews have revealed a particularly low level of numeracy among some employees: 91% of those surveyed at a leading hospitality company and 88% of healthcare assistants at an NHS Hospital Trust were below Level 2 (good GCSE pass equivalent). Among those with a GCSE at grade C or above, only one in eight reached the equivalent level when tested for numeracy.

Work with the Nuffield Foundation's Q-Step programme shows that many social science undergraduates are not confident with basic mathematical concepts (such as place value) that should have been secured in early primary schooling.

17m

17 million adults in England - half of the working-age population - have everyday maths skills roughly equivalent to those expected of a primary school child (Entry Levels)⁷.

OECD data shows that the UK has below-average numeracy proficiency overall and is the only country where skills of 16-24 year olds are no better than those of 55-65 year olds⁸.

⁴ OECD/INFE International Survey of Adult Financial Literacy Competencies (2016)

⁵ Ibid

⁶ Ibid

⁷ Skills for Life Survey (2012). 78% in 2011, 74% in 2003.

⁸ OECD 2013 'Survey of Adult Skills (PIAAC)



“Getting the Essentials of Numeracy has helped me improve my wellbeing and have a less stressful life. It has also developed my professionalism and leadership skills.”

Foluso Akamde

Numeracy in the UK: the cost

Poor numeracy matters both for individuals⁹ and for the future productivity of the UK in a global marketplace. In a post-Brexit era, where the country is critically dependent on the skills of its people, arguably it will matter even more.

For individuals, low levels of numeracy are linked to unemployment, low wages and poor health and there is evidence that numeracy is even more closely related to wellbeing and socio-economic achievement than is literacy¹⁰. Recent research in the UK shows that there is, unsurprisingly, a strong link between numeracy and financial capability¹¹. Specifically, research from the Money Advice Service, due to be published in the autumn, suggests that: (a) numeracy is a significant predictor of savings frequency even when allowing for income and other variables, (b) higher numeracy is associated with higher savings (independent of income) and (c) lower numeracy is linked to poor use of credit.¹² Further afield, research in the US found that 'numeric ability predicts mortgage default'¹³.

At the national level, a 2014 report for National Numeracy from Pro Bono Economics (PBE) estimated the bill for poor numeracy at around £20 billion a year, with

the cost shared by individuals, employers and government. The cost (in lower wages) for individuals was estimated at £8.8bn per year. Shared amongst the 20 million¹⁴ working age adults with low numeracy and allowing for inflation, this provides a central estimate of £460 per person per year. Using PBE's upper and lower limit estimates for the cost to individuals (£2.9bn and £14.9bn respectively) the cost could be as high as £742 per person per year.

The Cabinet Secretary, Sir Jeremy Heywood, has argued that 'poor numeracy is a direct drag on UK productivity – we therefore need to find better ways to improve numeracy in the workplace'¹⁵. National Numeracy is starting to do just that and our work with employers is uncovering how low actual workplace numeracy levels are (more or less reflecting national levels – generally much to the surprise of management) and the impact of this on productivity.

£460

Estimated cost per year to each of the 20 million working adults with low numeracy

⁹ Andreas Schleicher, the Head of the OECD Research programme, has suggested that among the variables that the OECD measure, 'good numeracy is the best protection against unemployment, low wages and poor health' (2013)

¹⁰ Carpentieri, Litster and Frumkin (2009); New Philanthropy Capital (2010)

¹¹ Headline summary: 'low numeracy is a barrier to financial capability and higher numeracy enables greater financial capability.' MAS/Critical Research, October 2016

¹² 'The influence of numeracy on financial capability' MAS due Autumn 2017

¹³ Gerardi, Goette, and Meier (2010)

¹⁴ 20m average Working Age Population derived from ONS 2012 data and SFL 2011. WAP below Level 1 = 49.1% of 40,880,484 = 20,072,318

¹⁵ Behavioural Exchange Conference 2015

Through our work with businesses, we have had accounts of:

- Mistakes handling money, balancing tills and organising events.
- Staff doing things ‘the long way around’ and being less efficient with their time.
- Staff shunning key responsibilities because of fears about numeracy, putting pressure on others in the team.
- Staff avoiding or dropping out of apprenticeships because of anxiety about numeracy.

Within the National Health Service, comments from staff include:

“They get fluids wrong so patients are kept in, taking up beds.”

Nurse, Acute NHS Trust referring to Health Care Assistants

“I want to train as a nurse but the maths holds me back.”

Senior Health Care Assistant

“Most of our Health Care Assistant jobs don’t need maths.”

HR Manager, NHS Trust

“In the roles I’ve had, the managers have been the worst people for not wanting to deal with maths and the idea of brushing up skills.”

Nurse, NHS Trust

“

Poor numeracy has a significant impact not just on individuals, but also on businesses and the economy, as it is a common skill required in almost all forms of work.

”

**Peter Cheese,
Chief Executive,
CIPD (Chartered
Institute of
Personnel &
Development)**

Numeracy in the UK: why things aren't working

There has been a focus on improving literacy and numeracy for many years. However, given that we are still not producing an adequately numerate population, existing approaches appear not to be working. It is worth examining why.

Functional numeracy is assumed but not tested

In so many contexts, the problem of poor numeracy is simply not 'outed'. The assumption is that most people get by fine and the underlying impact of low numeracy is not considered. Banks and the financial sector – not to mention politicians and the media – assume a reasonable level of numerical understanding by their customers and the general public¹⁶. And few employers are aware of the numeracy needs of their workforce. But given that the UK is struggling with productivity compared to its competitors¹⁷, might not poor numeracy among so many in the adult population be a strong contributory factor? Evidence from our work with employers and unions suggests this is indeed the case. And yet the specific issue is barely recognised, not least because, up to now, there has been no available means for people to check their numeracy level.

Hidden behind mathematics

Numeracy has tended to be merged with literacy or subsumed within school maths, even though the issues – and therefore potential solutions – are fundamentally different. To start with, numeracy does not equal maths. Mathematicians would recognise that, but the school curriculum in England seems not to¹⁸. As the Conservative peer Lord Lucas recently pointed out, there is a distinction that is not currently being made between an education for (a few) mathematicians and a mathematics education (for all)¹⁹. The secondary school mathematics curriculum – and specifically the GCSE exam – is generally orientated towards the former, with complex abstract maths presented in simple contexts. Evidence from the government's 2012 Skills for Life survey and elsewhere suggests this is not the best way to enable everyone to be confident in using simple maths in the complex practical contexts they will encounter in life and at work. The Essentials of Numeracy is our response – equipping adults with the skills and confidence that are needed in the workplace and life.

¹⁶ "...to date checking whether people have sufficient confidence and competence in using numbers to make sound financial decisions and calculations, has not routinely been part of the debate in financial capability. We have now gathered more evidence to suggest that this should change and we look forward to working with National Numeracy and others to take this agenda forward." David Haigh, Money Advice Service June 2017.

¹⁷ See 'Productivity puzzles' speech by Andy Haldane at LSE on 20 March 2017 for review of the evidence

¹⁸ In Wales there are two separate GCSEs: Mathematics and Mathematics-Numeracy.

¹⁹ Westminster Education Forum April 2017

Hidden behind literacy – ‘literacyandnumeracy’

So often within discussions of literacy and numeracy, the two are written and spoken of in combination as if they are a single skill, with literacy frequently used as a proxy for both. Within further, adult and community education there are very few numeracy specialists. Often vocational tutors are asked to teach both subjects and if a specialist tutor is employed, more often than not their specialism will be in literacy. But the subjects are different and require different teaching approaches and skills. Developing the skills to interpret and use the English language, which is complex and irregular, is cognitively taxing but almost everyone accepts the need to read, write and communicate to be successful. In contrast, ‘maths anxiety’²⁰, combined with a lack of clarity about what is really essential (‘I have a calculator and Siri so I don’t need to do this’) inhibits students and creates cultural barriers to engaging with numbers and data. But our evidence suggests that the cultural barriers can be overcome – and once they are, becoming numerate (e.g. able to calculate 5% of £9) may be less cognitively taxing than becoming literate.

GCSE – bottom 1/3 fail irrespective of absolute performance

There is another specific barrier in the system. GCSE is largely cohort-referenced; in other words, relative rather than absolute scores determine whether students pass or fail. Currently grade boundaries are set so that a third of each cohort falls below a grade C (or grade 4 from summer 2017) – the level prized by employers and further/higher education – irrespective of their absolute performance. This is an inefficient use of human capital; the system is structured to ensure that a third of all 16-year-olds are effectively being told that they ‘can’t do maths’. It is little wonder that they come to believe it, as indeed do many others who scraped through the exam by rote learning without firm conceptual understanding.

Qualifications but not underlying skills

As the OECD has repeatedly pointed out, the education and skills system in the UK has become adept at generating qualifications – but without securing the implied underlying improvement in skills. For example: ‘At every qualification level, low basic skills are more common...in England than in many other countries. This means that despite the rapid expansion of educational opportunities, and a relatively well qualified cohort of young adults, the basic skills of this cohort have remained weak.’²¹



Poor numeracy is a pervasive but hidden issue across the UK workforce – impacting negatively on individuals and the productivity of UK plc. We clearly need to do things differently given that approximately half the adult population have the number skills that we expect of primary school children.



**Lord Gus O’Donnell,
Chair of Frontier
Economics and
former Cabinet
Secretary**

²⁰ See for example: The Math Anxiety-Performance Link - A Global Phenomenon (Foley et al - Feb 2017) and Intergenerational Effects of Parents’ Math Anxiety on Children’s Math Achievement and Anxiety – (Maloney et al - Aug 2015)

²¹ Building skills for all: A review of England OECD 2016

All-consuming focus on the education system

The attention of politicians, the media and sometimes – it has to be said – employers has been concentrated on ‘fixing’ maths in schools and colleges, on improving the maths of the future workforce rather than addressing the numeracy shortcomings of the existing adult workforce. The evidence from the OECD cited within this report suggests that this focus is not delivering an improvement in basic skills, but even if it were, some simple back-of-envelope sums²² show that it is impossible to generate significant productivity gains in the near future by this means. The numbers are against it. To drive productivity in the coming decade, we need to pay serious attention to developing the numeracy skills of those already at work – some of whom will be at work for another 40 years or more.

Although there is now support across the political spectrum for extending maths education among young people and preventing early drop-out, there is one very significant hurdle. Current indications²³ suggest that we will be unable to properly staff expanded maths education in schools and colleges in the near future. While that is a complex problem that needs determination, money and time to resolve, it does suggest that a lot more attention needs to be paid to the effective use of technology, as Sir Adrian Smith has proposed.

Current (high) cost assumption prevents scale

The current model for improving numeracy assumes a cost per learner based on comparatively intense, normally face-to-face, skills-based teaching. For example, a European Social Fund/Skills Funding Agency

project in the South East Local Enterprise Partnership provides £2.16m to fund work with 2,620 people, a cost of £824 per learner. The Skills Funding Agency spends around £250m per year on Functional Skills numeracy qualifications, at a standard cost of £724 per qualification. This approach lacks both scale (fewer than 350,000 adults per year) and the potential to deliver scale (at this rate, the theoretical cost to support adults with primary school level numeracy would be £12.3 billion) and there is no evidence that it is working across the population or reaching those who would benefit most. Indeed recent numeracy surveys and analysis point in the opposite direction.

Attitudes: ‘I can’t do maths’

Alongside all these hurdles goes the problem of attitudes: the social acceptability of saying ‘I can’t do maths’, the belief that maths doesn’t really matter that much, that it is an obscure subject often feared and best avoided. This is not something that adults would brag about in those countries that outperform the UK both in numeracy and productivity. National Numeracy has challenged this approach at every opportunity since our inception in 2012 and there have been some successes – for example, the cosmetics giant L’Oréal agreed to drop the ‘maths was never my thing’ line from an advertising campaign. But challenges arise from unexpected quarters: in 2016 The Times of India reported Prince William quipping to a no doubt puzzled audience of students in Mumbai that he was ‘terrible at maths’. Clearly the problem remains deep-seated and nuanced – and more needs to be done to tackle it and thereby encourage those whose opportunities to get on in life are limited by their poor numeracy.

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Making the numbers add up is as important in the NHS as it is in all workplaces. That’s why all staff must understand the Essentials of Numeracy and this work is not just essential but critical to providing 21st century healthcare.

”

**David Roberts,
Non-Executive
Director, NHS**

²² c.770k people join the workforce each year, which represents c.1.9% of working-age population. There are c.20m adults - 49% of working-age population at primary school level numeracy. Even if the flow is ‘fixed’ the dilution rate is low.

²³ ‘If we were to get to steady state... you would need 1 in 5 of Maths graduates to go into teaching, comparable figure for history is 1 in 25’. Sir Adrian Smith WEF April 2017



“Whilst working towards the Essentials of Numeracy I was able to overcome maths anxiety and pass on new skills to colleagues. You can only win from it, you can’t lose.”

Jackie Baker

The Essentials of Numeracy has been gaining real traction as a viable, sustainable solution to improving the numeracy of the UK. Here are the words of just some of our supporters:

“Poor numeracy can hit workplace productivity and also has profound economic and social effects for households who fall into problems with debt and financial hardship. Data from the 100,000 who have already engaged with the National Numeracy Challenge shows that improving basic numeracy online at low marginal cost is possible. The Essentials of Numeracy report is a key milestone to begin to tackle these important societal issues. Next, we need to see such initiatives on scale to bring about real improvements to support the economy.”

Andy Haldane, Chief Economist, Bank of England & National Numeracy Trustee

“Making the numbers add up is as important in the NHS as it is in all workplaces. That’s why all staff must understand the Essentials of Numeracy and this work is not just essential but critical to providing 21st century healthcare.”

David Roberts, Non-Executive Director, NHS

“Poor numeracy is a pervasive but hidden issue across the UK workforce – impacting negatively on individuals and the productivity of UK plc. We clearly need to do things differently, given that approximately half the adult population have the number skills that we expect of primary school children.”

Lord Gus O’Donnell, Chair of Frontier Economics and former Cabinet Secretary

“The Nuffield Foundation supports National Numeracy’s commitment to encouraging numerate behaviour and attitudes in adults and children through its ‘Essentials of Numeracy’ model. We know that most people stop studying maths after GCSE, so it’s important to develop other opportunities for teaching and learning numeracy skills. This is one of the drivers behind Q-Step – a programme to increase the quantitative skills of social science undergraduates – which the Nuffield Foundation developed in partnership with ESRC and HEFCE. We have recently commissioned National Numeracy to work with Q-Step Centres to develop a new version of its Check-Up tool, which we believe presents a great opportunity for students to assess and develop their numerical skills and confidence.”

Simon Gallacher, Head of Student Programmes, The Nuffield Foundation

“The TUC has worked with National Numeracy since their launch in 2012 and we strongly support what they are doing to enable everyone to get the Essentials of Numeracy. I am keen to see more employers engage with National Numeracy and Unions on this vital issue.”

Frances O’Grady, General Secretary, TUC

“My recent work reviewing Post-16 mathematics education for the government has surfaced a number of wider issues, including the remarkable statistic that approximately half the adult population have the number skills that we expect of an 11 year old – or worse. Clearly we need to do things differently and embedding the Essentials of Numeracy within the workplace would appear to be a sensible start.”

Sir Adrian Smith, Vice-Chancellor, University of London

“With the world of work changing faster than ever, it’s clear that functional maths skills are an important part of adapting for the future. I welcome the work of National Numeracy and the Essentials of Numeracy campaign, which will make an important contribution to meeting this challenge.”

Sir Charlie Mayfield, Chairman, John Lewis Partnership

“The Essentials of Numeracy sets out the skills and understanding that everyone needs to cope with the ordinary demands of life and work. This is an entirely practical and pragmatic approach, but it does not mean that it is trivial or simplistic. The Essentials actually involve quite deep numerical reasoning and a mathematical attitude towards making decisions and solving problems. Those are qualities that everyone can learn to develop, as National Numeracy demonstrates through its resources.”

**Lynne McClure, Director,
Cambridge Maths**

“Poor numeracy is an underlying issue for so many of our Prospects customers so it has been fantastic to work with National Numeracy to incorporate their innovative approach into our Work Programme delivery. We strongly support the drive to enable everyone to get the Essentials of Numeracy – we need an unrelenting focus on this because we have a long way to go.”

**Brenda Cabras, Director
of Employment &
Training, Prospects**

“I commissioned National Numeracy to conduct a review of staff attitudes and levels at a leading training provider. The analysis showed that we had work to do on the attitudinal-side and by focus on this rather than just staff competence we saw real improvement in learners’ results.”

**Iain Salisbury, Chief Executive
Officer, Aspiration Training**

“We welcome the launch of the Essentials of Numeracy. Recent research commissioned by the Money Advice Service has shown that low numeracy can be a barrier to financial capability and that higher numeracy can enable greater financial capability. This seems common sense but to date checking whether people have sufficient confidence and competence in using numbers to make sound financial decisions and calculations has not routinely been part of the debate in financial capability. We have now gathered more evidence to suggest that this should change and we look forward to working with National Numeracy and others to take this agenda forward.”

**David Haigh, UK Financial
Capability Director,
Money Advice Service**

“I make no secret of the fact that I love maths but I also know not everyone is like me and many were thrilled to have left trigonometry and algebra behind in the classroom. But there is some maths that everyone really does need a grasp of to make good, informed decisions both at home and at work, which is why I wholeheartedly support the Essentials of Numeracy.”


**Rachel Riley, TV Presenter
& Mathematician**

“Poor numeracy has a significant impact not just on individuals, but also on businesses and the economy, as it is a common skill required in almost all forms of work. The contribution of basic skills to workplace productivity has been increasingly recognised in recent years, but much more needs to be done to address the challenge and provide the education or training to better build these skills for the future. I strongly support the work that National Numeracy is doing to enable people to get the Essentials of Numeracy and I am keen to see more employers engage with the issue.”

**Peter Cheese, Chief Executive,
CIPD (Chartered Institute of
Personnel & Development)**

“National Numeracy have conducted a Numeracy Review for Premier Inn, of which the report provided critical insight into the level of numeracy our teams are operating at. This has proven incredibly useful in raising the issue to leadership and shed a new light on the impact of numeracy on productivity, progression and tenure. We recognise the need to support our teams with the Essentials of Numeracy and are working to further understand the impact in specific roles across the organisation. I would advise any organisation to seek to understand the impact numeracy is having within their organisation.”

**Tim Douglas, Funding &
Data Manager, Whitbread**

A man with short, light brown hair and blue eyes, wearing a white long-sleeved button-down shirt, stands with his arms crossed. He is holding a white rectangular sign in front of his chest. The background is a blurred office setting with light-colored walls and a window. The text on the sign is in a bold, purple font.

“Probably like everyone I was a bit nervous before doing the Challenge. After logging in a few times I realised that it’s not complicated, it’s stress-free. By working towards the Essentials of Numeracy I’ve learned new skills to help me progress in my career and in my life.”

Marek Materkowski

The Essentials of Numeracy: a new solution

We believe there is now scope for a clear definition of exactly what maths all adults need to know and be able to do, in order to cope with the ordinary demands of modern life and their own particular workplace. This needs to be turned into a practical plan with readily available resources to identify poor numeracy and assess and improve skills. It also needs to provide support and encouragement in order to challenge negative attitudes and create ‘can-do’ confidence. And it needs to be scaled up to benefit at least half the working-age population – that is the extent of the problem that we are talking about.

National Numeracy has now developed, piloted and tested such a plan and is looking to expand it to a wider audience. We have worked with employers, unions, charities and maths experts to define the Essentials of Numeracy for all (see figure 2) and to develop the tools to put them into practice. The Essentials are the skills and attitudes that

everyone needs to make good decisions at work and at home. That means, for example, being able to understand percentages to get the best-buy deals, make sense of statistics in the news and manage your money. It doesn’t mean doing algebra and trigonometry, memorising formulae and working out equations removed from a real-life context.

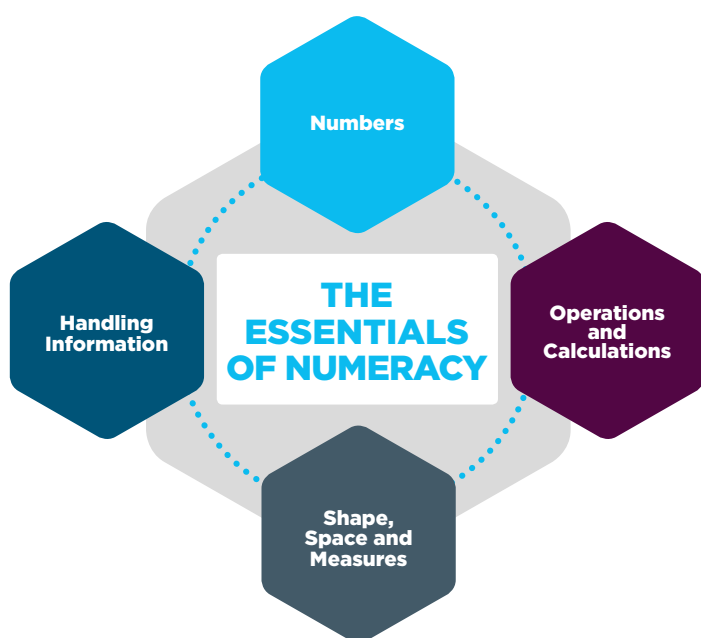


Figure 2: Diagram showing the Essentials of Numeracy.

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“The Essentials of Numeracy set out the skills and understanding that everyone needs to cope with the ordinary demands of life and work. This is an entirely practical and pragmatic approach, but it does not mean that it is trivial or simplistic. The Essentials actually involve quite deep numerical reasoning and a mathematical attitude towards making decisions and solving problems. Those are qualities that everyone can learn to develop, as National Numeracy demonstrate through their resources.”

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**Lynne McClure, Director,
Cambridge Maths**

Two faces of mathematics

The two examples in figure 3 below correspond to very different approaches and demands. Solving a linear equation can be (and, all too often, is) taught and learnt as a set of techniques to be memorised, without any real understanding of *what* is going on, or *why*. The train ticket problem simply does not have a neat, unambiguous answer. It prompts a number of further questions and real-world considerations (How many days a month will you realistically travel? What about factoring in sickness and holiday? What will it cost you to find the money upfront? Should you consider weekly tickets?). There is no 'right way' to do the calculations involved and estimation plays an important part. Moreover, it is by no means obvious that either one of our examples is inherently more intellectually challenging than the other. The first example involves more 'advanced' mathematics (algebra rather than arithmetic) but the real-world considerations in the second example probably make it more challenging.

School vs Real world

School Mathematics

$$2x - 5 = 13$$

Solve for x

Real world Mathematics

A monthly train ticket costs £194.
The daily return fare is £13.50.

Should you buy individual daily tickets, or a monthly season ticket?

Figure 3: a comparison between the type of 'maths' found in schools and the 'real-world'

Building 'mathematical resilience'

Through the Essentials of Numeracy, we are proposing an explicit, national focus on 'simple maths in complex situations'. We believe that everyone in the UK can become numerate but that, to achieve this, negative attitudes must be challenged. As well as learning specific skills, 'being numerate' - being ready to see a problem as mathematical, to look for mathematical solutions, to spot patterns and connections - is at the centre of the Essentials. It is necessary to build what is sometimes described as 'mathematical resilience' in order to achieve that. And this involves seeing the value of learning to you personally, believing that you can improve (there is no maths gene) and putting in the effort where it is needed, accepting that everyone struggles in order to succeed (see figure 4). We are not saying that it is easy, but it can be done, and National Numeracy offers support and a route to achievement.



Figure 4: Schematic used to highlight the importance of the value, belief and effort concept.



“My numeracy has never been great. However, working towards the Essentials of Numeracy has helped me to do things effectively in my job. I’m getting the help that I needed and I am excited to be learning all the time.”

Said Lamdani

Our approach

We know that negative attitudes and the fear factor are holding many people back and indeed are the primary inhibitor for most of those with poor numeracy. This is not always taken into account in numeracy learning but it is something we address explicitly with our approach. We work across the whole learning journey (see figure 5) on both skills and attitudes, so that people gain confidence and develop a more positive 'can-do' attitude at the same time as they develop the actual numeracy skills. This dual approach is indispensable.

The offer

We offer a range of resources and services to help people to get the Essentials of Numeracy either directly themselves, at work or within an existing training programme. Central to this is the National Numeracy Challenge (see figure 6), first introduced in 2014 and with over 100,000 people registered so far. It supports adults in reaching a good level of everyday maths, through positive messaging, an online assessment and learning tailored to specific needs. Working with employers and other intermediaries, it aims to improve the skills of a million people over the next five years. Of those who have checked their level, gone on to do some learning and then reassessed their numeracy, *three quarters have improved*. Along with supporting individuals online, we have successfully trialled our suite of Essentials of Numeracy resources and services among job seekers, private and public sector employees and banking customers. Within NHS Trusts, we have seen initially maths-phobic staff get the Essentials of Numeracy within 12 weeks with *only attitudinal support*. We now want to scale up this impact.

Distance travelled



Figure 5: Schematic highlighting the learning journey



Figure 6: The National Numeracy Challenge website and logo



“Achieving the Essentials has given me a lot more confidence in the workplace, to have the courage to say, actually I can do this. I’m thankful that I’ve now got the opportunity to progress.”

Jane Bell

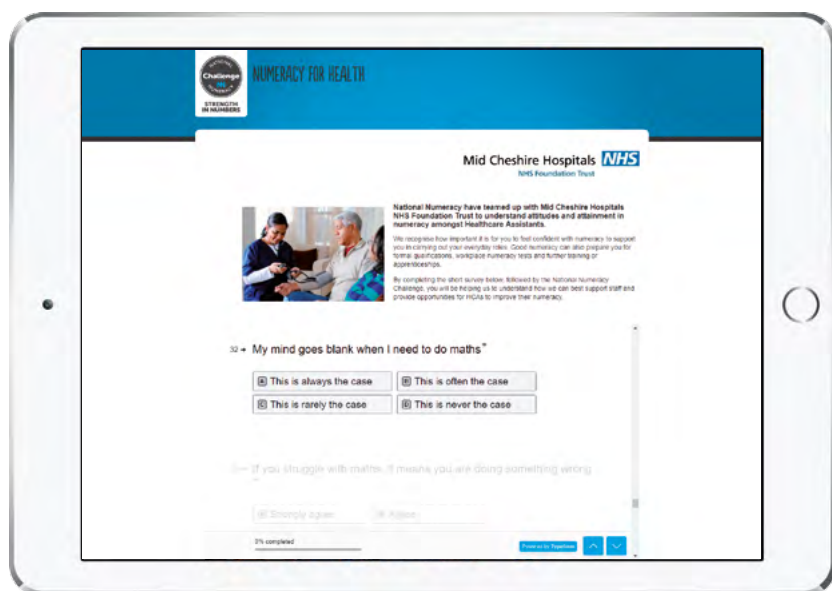


Figure 7: Part of the attitudinal assessment

What we provide to employers

Resources to benchmark current numeracy levels and attitudes (see figure 7) to numeracy and then a range of services to support staff who are working towards getting the Essentials of Numeracy. Early evidence from NHS trusts and other organisations we have partnered with suggests that our Essentials approach can make a real difference to the way staff work and so – we suggest – affect productivity.

“

National Numeracy have conducted a Numeracy Review for Premier Inn, of which the report provided critical insight into the level of numeracy our teams are operating at. This has proven incredibly useful in raising the issue to leadership and shed a new light on the impact of numeracy on productivity, progression and tenure. We recognise the need to support our teams with the Essentials of Numeracy and are working to further understand the impact in specific roles across the organisation. I would advise any organisation to seek to understand the impact numeracy is having within their organisation.

”

Tim Douglas, Funding & Data Manager, Whitbread

“

Making the numbers add up is as important in the NHS as it is in all workplaces. That's why all staff must understand the Essentials of Numeracy and this work is not just essential but critical to providing 21st century healthcare.

”

David Roberts, Non-Executive Director, NHS

What we provide to workplace training providers

Paid-for resources (see figure 8) and services to include the attitudinal element that will make their delivery more effective. Initial work suggests that an attitudinal focus will improve engagement, retention, attainment and the long-term impact of their skills training.

All these areas of numeracy are crucial for everyday tasks		
Area of numeracy	Eg. Task	Average Level of your Staff
Operations and Calculations	Working out net present value on new housing developments	Lower L1
Numbers and the Number System	Working out someone's monthly wage from their timesheet	EL3
Being Numerate	Managing large financial budgets	Lower L1
Shapes, Space and Measures	Working out the ratios needed to dilute cleaning fluid	EL3
Handling Information	Working out travel and appointment times for service users.	Higher L1
	Working out medication for a service user	
	Checking cars have filled out the medication charts correctly.	
	Interpreting statistical information	
	Working out how much stock to order for the kitchen from past use	

...but staff are not currently at the right level

Figure 8: Section from a Numeracy Review.

“

Poor numeracy is an underlying issue for so many of our Prospects customers so it has been fantastic to work with National Numeracy to incorporate their innovative approach into our Work Programme delivery. We strongly support the drive to enable everyone to get the Essentials of Numeracy – we need an unrelenting focus on this because we have a long way to go.

”

Brenda Cabras, Director of Employment & Training, Prospects

“

I commissioned National Numeracy to conduct a review of staff attitudes and levels at a leading training provider. The analysis showed that we had work to do on the attitudinal-side and by focus on this rather than just staff competence we saw real improvement in learners results.”

”

Iain Salisbury, Chief Executive Officer, Aspiration Training

What we provide to individuals

Free, mobile-friendly, access to the Challenge site so that anyone can check whether they have got the Essentials of Numeracy (see figure 9). If not, they will be guided to online resources to work towards getting them

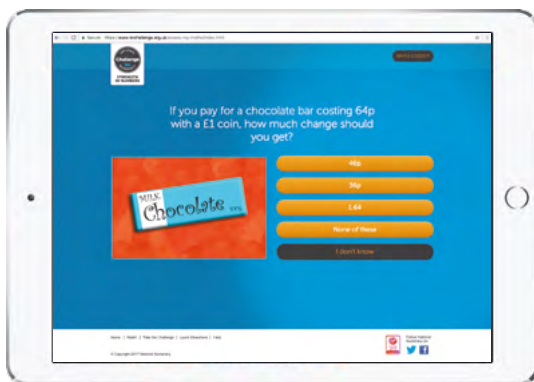


Figure 9: Question screen from the Challenge

“

The Challenge made me think about the ways I use maths everyday, and has encouraged me to try and work things out myself to keep improving my skills without just automatically reaching for the calculator.

”

Farnborough College Challenge Learner

“

Maths was scary. When they mentioned maths as part of my course I did actually think, I don't want to do this but they introduced the National Numeracy Challenge which I found very helpful.

”


Tina Carter Healthcare Assistant

Conclusion

The need to improve numeracy is more acute than ever in the current economic and business environment. If productivity levels are to rise, good number skills are essential for the workforce in every industry. They are also vital in everyone's daily life. We believe this can no longer be regarded as just a challenge for the education and skills system but is one that should be brought into the mainstream and tackled in workplaces and elsewhere.

We have identified the practical mathematical skills and the conceptual understanding that everyone needs to cope with the demands of everyday life – the Essentials of Numeracy – and we have the tools to help everyone to achieve these. Uniquely, we recognise the need to confront and repair negative attitudes to numeracy early on in the process.

Good numeracy is within the grasp of virtually everyone. We now call on government and policymakers, employers and those involved in workplace learning, charities and indeed people individually to join and support us in the drive to make the UK numerate.



“The Challenge is helpful as it takes you back to the basics. I didn’t realise how much numeracy I had forgotten since leaving school. It’s refreshed my knowledge which in turn, has boosted my confidence.”

Chris Eades

National Numeracy is an independent charity established in 2012 to help raise low levels of numeracy among adults and children and promote the importance of everyday maths skills. It aims to challenge prevailing attitudes, influence public policy and research, and identify and promote effective approaches to improving numeracy. Where possible, it works in partnership with other organisations to achieve these aims.



The Essentials of Numeracy

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