

Making it all add up

Business priorities for numeracy and maths



Improving numeracy and mathematics skills is essential – for individuals and for businesses – and must be a priority for the new government.

At present not enough young people leave school or college with the numeracy and maths skills they need for work and life. The UK must do better:

- All young people should leave formal education with the confidence and ability to use and apply numeracy and maths skills in the workplace or in their further study
- More young people must be encouraged to continue their numeracy and maths education post-16 to support the UK's need for highly numerate technicians and employees with high-level science, technology engineering and maths (STEM) skills
- The UK should set an ambitious aspiration – 25% of all undergraduates should be studying the STEM subjects business values (up around 50% on present levels).¹

Everyone needs to be confident and comfortable using numbers. This is important for everyday life as well as a key skill required in the workplace.

Employers want all employees to be numerate – confidently handling numbers, demonstrating general mathematical awareness and being able to apply basic skills in practical contexts, such as working out percentages, spotting rogue figures and making estimates.

And every employer needs some employees with logical and problem-solving skills which are grounded in an appreciation of mathematical theory – from finance professionals to project managers. Effective use of statistics and probability, complex calculations and algebra are common currency in modern workplaces.

What is numeracy?

Confidence with the handling of numbers, general mathematical awareness and its application in practical contexts.

What is mathematics?

A developing language for description, deduction, verification and calculation – more a set of tools than a specific learned skill.

Advanced and specialist use of mathematics is needed across science-based, hi-tech and IT businesses. Maths underpins study of science, engineering and technology.

Demand for higher level STEM skills will continue to grow in sectors where the UK already excels (such as IT, pharmaceuticals and high value-added manufacturing) as well as in future growth areas in green technologies and creative industries.

Conversely, demand for workers with low skills is declining – the share of jobs requiring only low-level skills has fallen from 60% to 40% over the last 15 years, and is predicted to decline to 32% by 2020.²

Without basic numeracy skills young people face an up-hill battle in the labour market. Those young people with few or no qualifications are five times more likely to be unemployed than their more

Numeracy and maths report card

	2009	Progress made	Areas for improvement
At end of primary education	Three quarters achieved the expected standard of level 4 in their key stage two tests.	Considerable improvement since 1996 when 62% achieved level four. But no improvement in last two years.	Pupils who don't achieve in primary struggle at secondary school – only 10% who don't get level 4 go on to achieve grade C or above at GCSE.
At GCSE	57% of young people achieved A*-C in maths. But over 100,000 candidates did not even achieve an F grade.	A*-C attainment is up from 48% in 1998/99. Functional skills will be taught from September 2010 and the 'twinning pair' maths GCSEs pilots will get underway.	Only 27% of pupils on free school meals get five good GCSEs including English and maths, compared with 54% of other pupils.
At A-level	8.5% of the cohort took A-level maths. Further maths A-level entries were up to over 10,000.	Improvement from low point of 2003 when maths entries dropped to 6.7%.	All young people should continue with some form of maths or numeracy post-16 – eg A-level, AS-level or higher level numeracy.
At higher education	Only 16% of UK students are studying science, technology, engineering or maths at university.	Interest in STEM degrees is up, but from a low base.	UK should set an ambitious aspiration for 25% of university students to be studying STEM.

Comments

The UK is falling behind its OECD peers in maths and numeracy, which is causing disruptions for other subjects. The UK has seen greater decline than most other OECD countries in the proportion of graduates doing STEM from 2000. Recent progress in maths and further maths A-level shows promise. But still too few young people continue with maths – again, the UK is behind key competitor nations as the majority of young people in France, Germany, Singapore, for example, continue with maths post-16.

The UK must do better if it is to reach its full potential

skilled counterparts, one of the highest ratios in the developed world.³

Those in work with lower skills levels also face disadvantage – employees with poor basic skills will earn, on average, 11% less than colleagues who have these skills.⁴

The cost to the taxpayer of students leaving school with poor maths skills has been estimated at £2.4bn a year.⁵

The latest CBI surveys show a fifth (18%) of employers had to provide remedial numeracy training to school leavers joining their organisation.⁶ Employers also have concerns about their existing employees' numeracy:

- Two-thirds (68%) are concerned about their employees' ability to spot errors and rogue figures
- Almost a third (30%) have concerns about their workforce's capability with basic multiplication and arithmetic calculations
- Over a third (37%) believe that using fractions, decimals and ratios prove difficult for many of the workforce.⁷

Young people themselves recognise deficiencies in their basic skills – according to a recent YouGov survey conducted for the CBI over a quarter of sixth-form students were not confident in their numeracy skills, rising to 31% of recent graduates.

Recommendations to achieve business outcomes

1 Ensure all young people continue with numeracy and maths in post-16 education and training

All young people should be expected to continue some form of maths or numeracy education after 16, whatever education or training route they pursue:⁸

- Students who fail to achieve an A*-C at GCSE at 16 and who have not achieved at least a level 2 Functional Skills qualification should be opted-in to courses to help them to do so
- There should be an expectation that students who achieve an A*-C at maths GCSE should be encouraged to pursue a maths qualification to at least AS level – such as 'Use of mathematics' if it is useful for their other subjects, such as statistics for history. If not relevant, students should continue to develop functional numeracy at a higher level
- There should be an opt-in for students who achieve a good benchmark standard in maths at GCSE – at least a B – to study at least an AS level in maths after 16. Those gaining an A* or A should be expected to pursue the full A level. For weaker students in this cohort, this AS level could be stretched out over two years to give them maximum support
- Students that pursue a vocational training route after 16 – such as an apprenticeship – should be expected to carry on their numeracy and maths education, either through the AS/A Level route or through progressing their Functional Skills in numeracy from level 2 to level 3
- Prior to the compulsory education and training age rising to 18, programmes for young people not in employment, education or training should focus on raising numeracy and maths skills.

2 Significantly improve the delivery and development of numeracy in schools

In 2006, the CBI defined what employers mean by functional numeracy and urged government to ensure that young people were taught to use and apply numeracy skills ready for the workplace. These skills are set out below.

While there has been a welcome focus on numeracy through the creation of functional numeracy qualifications, recent Ofsted reports show that more must be done.⁹ Many teachers currently do not have the skills or knowledge to deliver the applied approach to numeracy that is needed. Teachers need support to improve their own maths competency and guidance to show children why and how numbers are needed.

At present secondary school students are tested on numeracy but not taught it – most maths lessons focus on the curriculum and GCSE examinations.

Before young people reach 16 they must be given every opportunity to develop numeracy skills. This means schools and colleges need to take functional numeracy seriously – and build it into the curriculum.

Government must support schools to prioritise teaching and application of numeracy:

- With more continuing professional development for teachers
- By dedicating time within the curriculum to teach numeracy
- By focusing on teaching it, not just assessing ability
- Ensuring schools are accountable.

Numeracy and maths in the workplace

The CBI has identified that functional numeracy for the workplace incorporates a number of core maths skills and the ability to apply these:

- Mental arithmetic without using a calculator constitute an essential aid in all sorts of work activities
- The ability to interpret and respond to quantitative data is a key part of modern working life – employees need to interpret them to contribute to problem solving and quality improvement
- In many jobs it is essential to be able to calculate a percentage and interpret its significance
- A mathematically literate person will be able to work comfortably with fractions, decimals and ratios. For many organisations, the ability to use a formula is also highly desirable
- Employees need awareness of different measures and the ability to convert between them – eg imperial and metric
- A functionally numerate employee will almost instinctively pause to check potentially rogue results and calculation errors
- Some basic understanding of odds and probabilities enables people to make a more realistic assessment of risk and likelihoods.

3 Business must play its role to promote the importance of numeracy and maths

Business should provide examples of how maths is used in the workplace and support teachers with practical examples of applied uses of maths.

Business must continue to support schools, colleges and apprentices to improve numeracy and mathematics. Practical support is available to achieve this employer engagement – the Education and Employers Task Force has produced a guide for employers: www.employers-guide.co.uk.

The price of failure is high

Without basic numeracy and maths skills young people will find it difficult to progress in training or the workplace – 1.4 million workers in the UK believe they have missed out on a promotion, or even lost a job, due to a lack of basic maths or English skills.¹⁰

Young people who do not develop their maths knowledge will lose out on future earnings and career opportunities – maths A-level is the only A-level which adds to earnings, even when an employer doesn't know the qualification is held.¹¹ Opting out of maths at 16 will close off future study routes and access to universities such as London School of Economics and Cambridge as maths is one of their 'generally preferred' A-levels.

For businesses, the price of failure can be seen on the bottom line. One in three workers – 14.6 million people – admit their inadequate numeracy and literacy skills have lost their company money.¹² Without an uplift in numeracy and mathematics there will be a continued shortage of STEM skills, with the UK failing to capitalise on the potential to be world-leaders in sectors such as environmental technology, pharmaceuticals, high value-added manufacturing and creative industries.

This is why the government, working with business and schools, must act.

“National Grid has a crucial role to play in the energy industry which is vital to the prosperity and well being of the UK. It's impossible to underestimate the importance of STEM skills to our future and maths is the bedrock of STEM learning. Our message to young people is simple: if you recognise the crucial role that the energy industry has to play in addressing climate change and you want a challenging, exciting and rewarding career, then go study maths and science and help us to engineer a prosperous and sustainable future.”

Steve Holliday, chief executive, National Grid

Footnotes

- 1 Based on HESA data for 2008/09 all full-time undergraduates – excluding psychology and sports science
- 2 Share of employment by qualification level, 2004-2020 – Cambridge Econometrics/Warwick Institute for Employment Research (2009)
- 3 *Education at a glance*, OECD (2006)
- 4 *Counting the cost of poor maths and English skills*, Learndirect (2007)
- 5 *Innumerate school children cost the tax payer up to £2.4bn a year*, KPMG press release (2009)
- 6 *Education and skills survey*, CBI/EDI (2010)
- 7 *Employment trends survey*, CBI (2008)
- 8 ACME, the Advisory Committee on Mathematics Education, has produced a discussion paper on 14-19 maths, available at www.acme.org.uk
- 9 *Implementation of 14-19 reforms, including the introduction of Diplomas*, Ofsted (2009)
- 10 *Counting the cost of poor maths and English skills*, Learndirect (2007)
- 11 *A levels: does less mean more?* Anna Vignoles, CentrePiece Magazine (LSE) spring 1999, pp 8-11
- 12 *Counting the cost of poor maths and English skills*, Learndirect (2007)

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