Technology in UK Schools

A report for Lenovo

January 2020

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Executive Summary

This report provides detailed insight into the use of technology in UK schools in 2020, examining the types of technology that have been adopted, how this has been applied, and the ways in which this has shaped the learning environment. This has been achieved by conducting a survey of 2,000 teachers, covering a range of different school types across the UK, alongside one-to-one interviews with experts from the educational and tech sectors.

Key findings emerging from the survey include:

- Nearly one in ten (8%) schools fall into the inadequate category on the **Digital Proficiency Scale** developed within this report. One in five (20%) are in the excellent category.
- **One in five (18%) of all private schools fall into the highest scoring group**, compared to just 5% of the state schools in the survey.
- **Scotland** emerges as the part of the UK with the highest level of digital proficiency in schools.
- Examining the digital proficiency at different stages of the educational system reveals that **secondary schools and sixth form colleges score slightly** higher than primary schools.
- Smaller schools have on average a slightly lower overall score whereas bigger schools have a higher degree of technological proficiency.
- The survey revealed that the number one priority for teachers is to **increase the number of computers available to students in school**, followed by more provision of training for teachers on the use of technology.
- Nearly half of students access school computers **at least four times a week**.
- It is not very common for schools to provide laptops or tablets that students can bring home. Only **3% of the teachers work at schools where all students are equipped with laptops or tablets that they can bring home**.
- Microsoft Word and coding are the most common digital skills on the school curriculum.
- Teachers are using technology to digitalise their administrative work. **79%** of all teachers surveyed responded saying that they **are performing some or all their administrative tasks digitally.**

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Based on the survey results, but also informed by one-to-one expert interviews and a review of existing literature Cebr has developed the following recommendations:

- There is a need to **expand the provision of training to teachers**, in order to maximise the effectiveness of new technologies.

- Continue to **re-orient the curriculum towards developing digital skills for the future** such as coding, web-design and technologies of the future.

- **Encourage information sharing** among teachers to improve and inspire usage of new technology and digital skills in classrooms.

- **Expand funding opportunities for investment in new technologies** to address the shortfall identified by teachers and unlock the gains associated with higher workforce productivity in the longer term.

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1. Introduction

Technology has had a transformational effect on the way in which school pupils learn. Since the turn of the millennium, the spread of the internet has provided a gateway to vast amounts of information that was previously inaccessible or difficult and costly to acquire. Meanwhile, there has also been a continuous stream of new and innovative software – often utilising networks facilitated by social media – that has enriched the learning environment. The mediums through which information is conveyed have also evolved, from chalk boards to whiteboards, and later from interactive whiteboards to increasingly personal devices such as laptops or tablets.

The sweeping nature of these technological changes that have taken place in recent years means that few schools have been left completely untouched. With that being said, the benefits have by no means been distributed uniformly. This research develops a state of the nation picture of the use of technology in UK schools in 2020, examining the types of technology that have been adopted, how this has been applied, and the ways in which this has shaped the learning environment. This has been achieved by conducting a survey of 2,000 teachers, covering a range of different school types across the UK, alongside one-to-one interviews with experts from the educational, tech and other sectors.

The results of the survey are used to develop a Technological Proficiency Scale for each of the 2,000 schools covered, shedding light on the degree to which different schools have been successful in harnessing the benefits of technology and how this varies by region, school size, or school type (e.g. state, independent or grammar schools). The insights from the individual interviews and the survey responses then form the basis of a series of recommendations for how schools can most effectively improve their provision and application of technology in order to enhance the learning environment.

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2. Literature review

There is an array of channels through which technology can impact the educational system. As such, the role of technology in schools has been the subject of numerous studies by governments, research institutions and industry bodies. Some of the key findings from this existing body of research are laid out in the remainder of this section.

2.1 Technology and educational performance

Since the widespread introduction of digital technology in education, an extensive literature has developed around its impacts on performance in schools and on wider outcomes. Across the broad range of literature, there is a general consensus that the adoption of technology in education is beneficial.

A great deal of attention has been given to the impacts of new technologies on literacy and reading ability. A randomised experiment involving 46 pre-school children[1] who are at a high risk of learning disability showed that those who were given computer-based instruction – whereby students interact and engage with programmed instructional materials – significantly improved their phonological awareness (the ability to work with and recognise sounds in spoken languages), word recognition, and letter naming skills relative to their peers who received more conventional modes of instruction (i.e. textbooks) or no instruction. A meta-analysis of 20 research articles[2] presents similar results for middle school literacy programs. The study demonstrates that technology can have a positive effect on reading comprehension, although it concludes that future research in this field should explore a wider range of outcomes such as higher order thinking skills and behavioural or dispositional outcomes.

More recent improvements in technology, specifically the spread of touchscreen devices have allowed for a more interactive digital learning experience. Studies have found that tablet PCs allow students to combine the benefits of computer aided instruction – such as customised rates of progression and a wider array of learning materials – with the memory enhancing effects of handwriting.[3] Meanwhile, a 2010 randomised study of introductory university classes looked at the effect of interactive learning networks where students and instructors would interact via tablets during lectures.[4] This not only supported higher rates of student engagement but also allowed the instructor to see how well students answered problems during lectures and thus tailor the class accordingly.

1 D. Mioduser, H. Tur-Kaspa & I. Leitner (2000). The learning value of computer-based instruction of early reading skills. *The Journal of Computer Assisted Learning 16, 54-63.*

2 P. David Pearson, Richard E. Ferdig, Robert L. Blomeyer, Jr., Juan Moran (2005). The Effects of Technology on Reading Performance in the Middle-School Grades: A Meta-Analysis With Recommendations for Policy.

3 Smoker, T.J., C.E. Murphy and A.K. Rockwell (2009). Comparing memory for handwriting versus typing. *Proceedings of the Human Factors and Ergonomics Society, 53(22)*, 1744-1747.

4 Enriquez, A.G. (2010). Enhancing Student Performance Using Tablet Computers. *College Teaching, 58(3)*, 77-84.

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2.2 Role of technology in closing the learning gap

Technology also plays an important role in closing the learning gap between different groups of the population. Analysis by Adina Shamir & Ofra Korat (2012) finds that the use of e-books by children at risk of learning difficulties can lead to significant strides in emergent literacy skills such as vocabulary, the development of narratives and taking an interest in literary materials.

Another commonly espoused benefit of computers in the classroom is the capacity to teach to a mixed-ability class, since course materials can accelerate at a speed appropriate for individual students. Indeed, studies with random assignment of computer aided learning such as Banerjee et al (2007) and Barrow et al (2009), emphasise the advantages of teaching that is 'adapted to each child's current level of educational achievement'.[5][6] Both pieces of research find significant improvements in student attainment, with Barrow et al finding evidence to suggest that computer aided instruction is most beneficial for larger classrooms and for students with poor attendance. This supports the hypothesis that facilitating learning at different speeds can help to narrow the performance gap that currently exists between students.

Computer aided learning has been identified as an effective way of closing the educational attainment gap

Further evidence for this is provided by a study of the effectiveness of the web-based language learning tool Duolingo.[7] This found that the time taken to complete a first semester level introductory Spanish course could range from 26 hours to 49 hours depending on the student, highlighting how the flexibility of interactive digital tools to tailor lessons to individual needs can enhance the educational process and outcomes.

2.3 Impacts of technology outside of the classroom

Technology has delivered benefits beyond results and outcomes in the classroom. Technical change, largely driven by computer technology and applications, was a key component of the boost in average productivity observed across many industries in the late 1990s.[8] Technology has similarly been seen to have driven increases in teacher productivity, largely

5 Banerjee, A.V., S. Cole, E. Duflo and L. Linden (2007). Remedying Education: Evidence from Two Randomized Experiments in India. *The Quarterly Journal in Economics, 122(3)*, 1235-1264.

6 Barrow, L., L. Markman and C.E. Rouse (2009). Technology's Edge: The Educational Benefits of Computer-Aided Instruction. *American Economic Journal: Economic Policy, 1(1)*, 52-74.

7 Vesselinov, R and J. Grego (2012). *Duolingo effectiveness study*. Available at http://static.duolingo.com/s3/DuolingoReport_Final.pdf

8 Gorman, L. (2019). Technology and Productivity Growth. *NBER Digest*. Available at https://www.nber.org/digest/oct01/w8359.html

through a reduction in the amount of time spent on administrative work. A 2014 review[9] emphasises the positive impact of management information systems on school administration and management. The study describes the overall impact of information and communication technology in educational management as 'very positive', with benefits ranging from a reduced administrative workload for teachers to higher utilisation of school resources.

Technological proficiency in earlier stages of education also influences individuals' "future readiness" to integrate into the workforce. Technical digital skills are highly valued across the UK labour market, as evidenced by the large wage premiums given to computer science graduates as well as the support offered by the government which aims to encourage workers to develop these skills.[10] A 2014 report by the UK Commission for Employment and Skills identifies technology as one of the four trends shaping the future of jobs in the UK. The report goes on to outline the important implications of technology for the nature of work, which is becoming increasingly technology-intensive and network-oriented. More recent studies demonstrate that while this trend is unlikely to reverse, the nature of digital skills may change going forward. A Nesta report finds that digital skills connected to routine tasks such as accounting and office software are less likely to grow in demand compared to digital skills used in non-routine tasks such as design and problem-solving.[11] A related report on the future of skills and employment in the UK and USA, finds that general 'cognitive competencies and learning strategies' are the most important 21st century skills in the UK.[12] The report also highlights the core role of digital technology skills in occupations that are set to rise in prominence over the coming years, such as roles in the creative, digital and engineering sectors. Meanwhile, the 100 Jobs of the Future report by Griffith University emphasises the need for digital skills in combination with interpersonal skills, as the routine elements of many roles are replaced by machines, requiring workers to apply technology in a more creative way at the "human-computer interface".[13]

Workforce roles will increasingly require employees to interact and engage with computers on a deeper level

9 Shah, Madiha (2014). Impact of management information systems (MIS) on school administration: What the literature says. *Procedia – Social and Behavioural Sciences*, 116, 2799-2804.

10 Department for Education and S. Gyimah (2018), *Prime Minister announces £20 million Institute of Coding.* Available at: https://www.gov.uk/government/news/prime-minister-announces-20-million-institute-of-coding

11 Djumalieva, J., C. Sleeman (2017). *Which digital skills do you really need?* Nesta

12 Bakhshi, H., J. Downing, M. Osbourne and P. Schneider (2017). *The Future of Skills: Employment in 2030*. London: Pearson and Nesta.

13 Tyler, R., R.S. Bridgstock, P. White, D. Mather, T. McCandless and M. Grant-Iramu (2019). *100 Jobs of the Future*. Available at https://100jobsofthefuture.com/report/

2.4 Government stance

The UK government has played an active role in promoting technological adoption through the various stages of the education system. In 2014, it introduced a major overhaul of the national curriculum for computing and digital skills, replacing traditional ICT lessons – that focussed on routine tasks such as word processing or the use of spreadsheets – with a syllabus with a greater focus on skills such as computer programming.

The Department for Education's strategy document[14] stresses the role of technology as an important tool to help tackle some of the main challenges faced by the educational sector. The document identifies five key areas where technology could 'drive a step change' for educational institutions in the UK:

1. Streamlining administrative processes: this use of technology alleviates some of the administrative burden currently placed on teachers, freeing up more time to focus on interacting with students and developing improved methods and approaches.

2. Enhancing assessment processes: this can increase the efficiency and effectiveness of assessments in schools, making schools more able to track and accurately gauge the performance of students, and adjust their strategies accordingly.

3. Improving teaching practices: technology opens the door to a variety of new ways in which information can be conveyed.

4. Continuing professional development: the training and knowledge-sharing facilities offered by technology can support the professional development of teachers as well as staff more generally in the educational system.

5. Facilitating lifelong learning: technology can assist students with making decisions about work and future studies and can also help those who are not in formal education to acquire valuable skills. This in turn has the potential to boost workforce productivity across a number of sectors – something that will be vital for the UK economy over the coming decade as the employment expansion that has driven growth over the past ten years begins to lose steam.

14 Department for Education (2019). *Realising the potential of technology in education: A strategy for education providers and the technology industry.*

3. Digital Proficiency Scale

While the research outlined in the preceding section has contributed to the sizeable body of evidence that exists regarding the potential benefits of technology in schools, data on the levels of technological provision in UK schools is relatively limited. In order to address this shortfall, Cebr has developed a Digital Proficiency Scale, which assesses the provision and application of technology in more than 2,000 schools across the country, covering a range of age groups and school types, such as comprehensive, independent and grammar schools. Scores for the Digital Proficiency Scale are computed via an in-depth survey of teachers working at each of the schools analysed.[15]

3.1 Defining digital proficiency

The Digital Proficiency Scale incorporates a broad range of factors, each of which covers a distinct aspect of a school's technological provision and adoption. Specifically, each school has been scored based on its performance in four key categories, which are discussed below:

1. **Use of technology by students at school:** This indicator considers the utilisation of technology by students when they are at school. The primary focus is on the provision of computers, since these are the primary medium through which digital skills are developed and digital learning methods are implemented. The main factors analysed are the number of students per computer and the number of times the average student uses a computer at school during a typical week. Both the availability and the actual usage of computers need to be considered when evaluating the level of digital proficiency, in order to establish the degree to which schools are utilising their existing technology.
2. **Access to technology for students at home:** This indicator considers the technology that schools provide to students to access from home. This involves the provision of computers that can be used outside of regular school hours, as well as the provision of funding to aid with the purchase of personal computers, laptops or tablets.
3. **Digital skills development:** While it is important for students to have access to laptops and tablets during their education it's equally important to make sure that students learn digital skills such as data management, coding and website design. These skills are essential in today's economy, and the earlier students are exposed to these kinds of digital skills the easier it will be for them to learn. To measure the level of digital skills development taking place within each school, teachers are asked which specific digital skills form part of the school's core curriculum. The survey also examines whether schools offers any extracurricular opportunities for students to enhance their digital skills, such as before or after school programmes or supplementary reading materials.
4. **Use of technology by teachers and administrators:** The level of a school's digital proficiency is not limited to students' usage of technology. As explored in the literature review, an important benefit associated with technology in education is the reduced amount of administrative workload. The survey therefore includes questions that explore the share of teachers with regular access to a computer while working,

15 Survey conducted by YouGov between December 2nd and December 15th 2019.

the extent to which the school's administrative work is carried out digitally, and whether certain tasks are automated through the use of software, such as the generation of reports or the distribution of letters and assessments.

3.2 Methodology

For each digital proficiency indicators outlined previously, a score of 0 to 100 has been assigned to each school – with 100 corresponding to the highest level of proficiency, and 0 corresponding to the lowest level of proficiency. An average has then been taken across the indicators to reach an overall digital proficiency score for each school, out of 100. The schools have accordingly been grouped into the following categories:

- Inadequate (scores below 40): these schools are found to be lacking in digital proficiency across most of the indicators covered;
- Acceptable (scores between 41 and 50): these schools tend to have satisfactory levels of digital proficiency in some areas but struggle in others, and are encouraged to improve their technological adoption in order to enhance their learning environment;
- Good (scores between 51 and 60): these schools generally perform well across the range of indicators covered, although some areas of weakness remain. Continued efforts are necessary to allow the school to reach the standards displayed by the highest performing schools;
- Excellent (scores above 60): these schools have an excellent level of technological proficiency, with a strong performance across the board. They are well positioned to maximise the benefits that technology can bring to both students and teachers at school.

The following sections present the results of the survey, and the implications of this for the digital proficiency of schools in the UK. Aside from providing a national picture of UK schools, results are presented for each UK region, school phase and school size.

3.3 National picture

The findings from the survey provide a revealing insight into the state of UK's schools' digital proficiency. There is a relatively wide spread of results across the sample, with nearly one in ten (8%) schools falling into the inadequate category, while one in five (20%) are in the excellent category.

Figure 1 illustrates that within the group of schools that score in the excellent category, there is a significant number with scores at the very top end of the distribution. Schools that fall into the highest scoring group of 71-74 are a mix of both independent schools, local authority-maintained schools and grammar schools. However, 18% of all private schools fall into this group, compared to just 5% of the state schools in the survey. This underscores the important role that funding plays in the ability of schools to attain a high level of technological proficiency.

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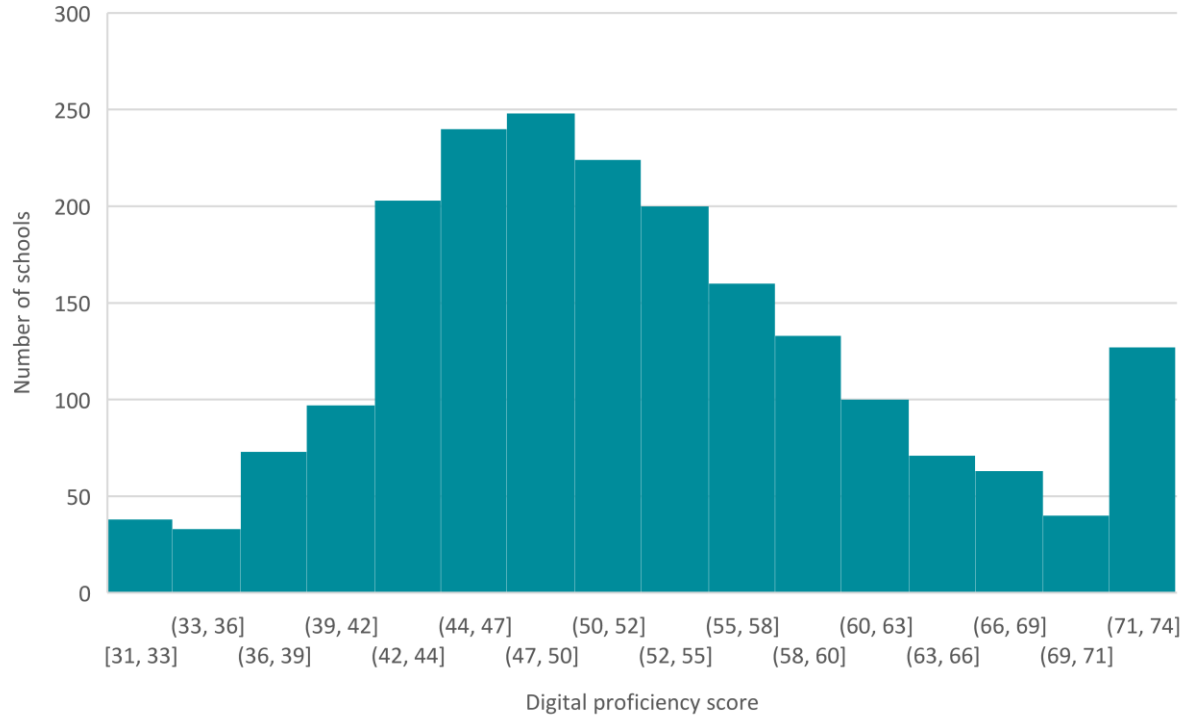
Figure 1 Distribution of Digital Proficiency Scores



The fact that 8% of schools in this survey fall into the inadequate category is concerning. This, together with the 41% of schools that are grouped into the acceptable category of the Digital Proficiency Scale, shows that there is still much to be done to improve standards in schools across the UK. In particular, these results suggest that many schools – as well as the government – can benefit from taking further steps to bolster the digital skills and improve the access to technology for both students and teachers.

Use of technology by students at school

A fundamental ingredient to unlocking the benefits of technology is the provision of computers. On average, teachers in the survey estimated that there were just over nine students per computer or laptop provided by the school.[16] Meanwhile, almost students in almost all schools access a school computer at least once a week, with nearly half (46%) accessing a computer four times per week or more often.

16 Estimates for the number of students per computer at schools vary depending on the methodology applied. Prior approximations include 3 computers per student (BESA, 2017) and 1.4 computers per student (PISA, 2012).

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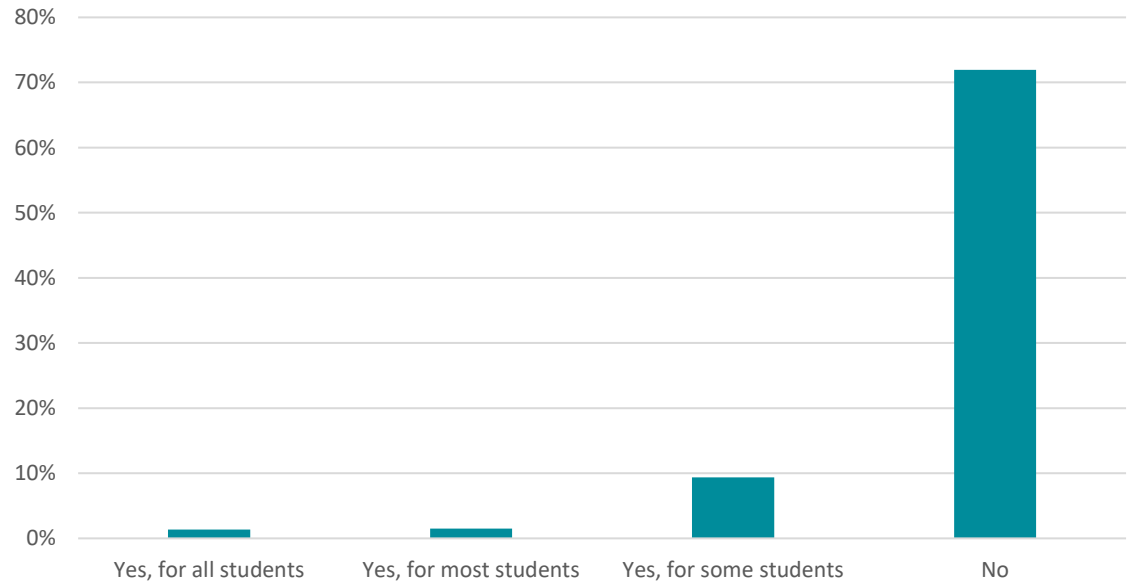
Access to technology for students at home

Schools in general perform poorly in the second indicator of the Digital Proficiency Scale, which assesses students' access to technology outside of school. Only 3% of the teachers surveyed indicated that all students are equipped with laptops or tablets that they can bring home, with more than three quarters (77%) stating that laptops or tablets are not provided to any students for use outside regular school hours.

Three quarters of schools do not provide any laptops or tablets for students to use outside of regular school hours

Additionally, very few schools provide funding to support the purchase of computers, laptops, or tablets for students' use at home. Only 1% of all teachers stated that their school provides funding, compared to 72% that reported that no funding was available. Given the considerable expense associated with these provisions, as well as the intense budgetary pressures faced by many schools, it is easy to appreciate why such funding measures remain relatively uncommon. However, as increasing amounts of the learning process shift towards digital platforms, it is essential that all students have the technology necessary to participate fully at schools. Since some students come from households that lack the financial resources to purchase the latest technology, there is a growing need for schools and the government to ensure that these children are not disadvantaged or left behind.

Figure 2 Degree to which funding is provided to support the purchase of computers, laptops or tablets by students



Digital skills development

When asked to cite the digital skills that are taught within the school's curriculum, the most frequent response from teachers was the use of Microsoft Word followed by coding & programming. The latter will have been bolstered by the government's reform of the computing curriculum in 2014. It is encouraging to see that most schools are now equipping students with the deeper programming tools that are vital for many roles in the workplace today. However, the fact that only around one in five (21%) schools are teaching students

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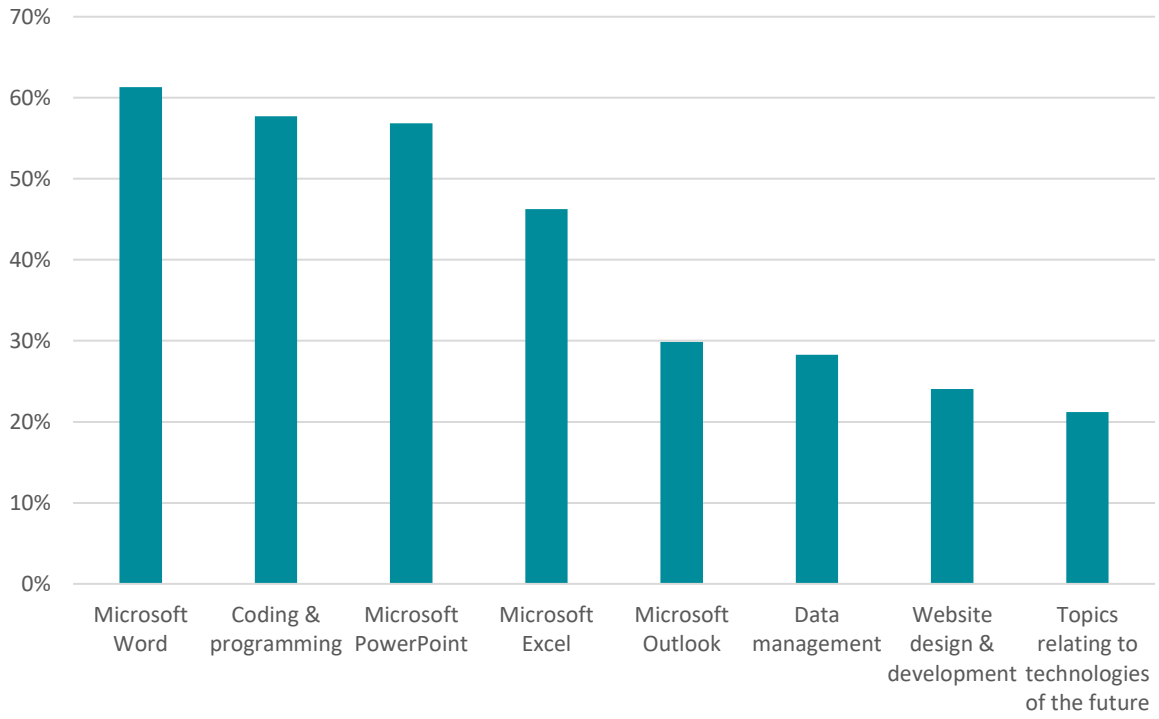
about technologies of the future such as machine learning and artificial intelligence shows that there is still some way to go.

Figure 3 Digital skills on schools' curricula



The survey results demonstrate that the most common online services provided by schools are an online platform on which students can submit homework or assignments, followed by online educational courses that students can access remotely. Meanwhile, 21% of teachers stated that their school offers some sort of after-school programme where they teach digital skills to students.

Use of technology by teachers and administrators

Another factor that was explored is the extent to which administrative tasks are carried out digitally. The levels of digitisation vary significantly depending on the task. Around two-thirds (66%) of teachers indicated that the task of recording students' contact information is carried out fully on digital platforms, compared to just 3% who stated that none of the task was carried out digitally. By contrast, the task of sending out examination results is still mainly carried out manually, with only around one in seven (14%) of teachers stating that this has been fully digitised. Moreover, only 7% of survey respondents stated that the task of setting or returning homework assignments is carried out exclusively on digital platforms, although just under a half (49%) indicated that some of this task is carried out digitally.

A similar picture emerges when looking at the levels of automation of administrative tasks that take place in schools. For many activities, such as the marking of tests and preparation and implementation of lesson plans, most schools do not use any automation. However, there are numerous examples of administrative tasks that are now automated. For instance, 63% of teachers in the survey said that the distribution of letters to parents or guardians is either partially (49%) or fully (15%) automated, while 65% said that the preparation of student reports for parents or guardians is automated to some degree. This is emblematic of the changes that technology is bringing to workplaces throughout the economy, where the automation of more routine tasks switches the focus to activities that require more creativity and higher order thinking skills.

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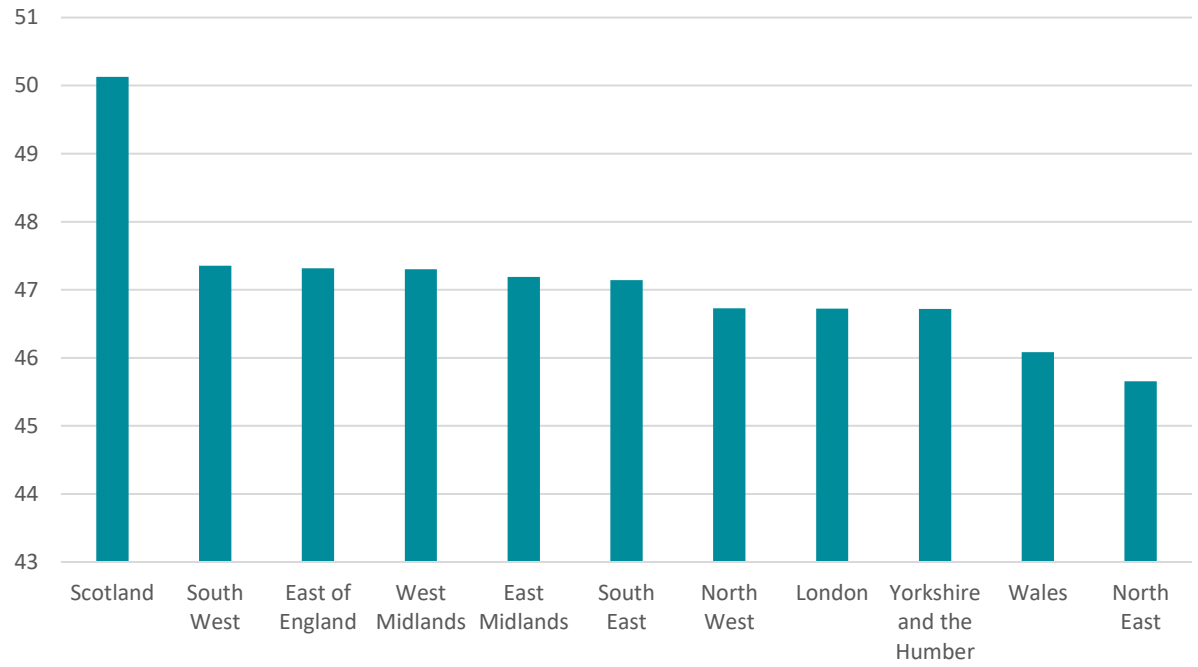
3.4 Regional results

Breaking down the results by region shows that Scotland emerges as the part of the UK with the highest level of digital proficiency in schools. While most of the regions across the UK have an average Digital Proficiency Score between 46 and 48, schools in Scotland have an average score of 50.

Scotland leads the way when it comes to technology in schools, with the highest average Digital Proficiency Score in the UK

Figure 4 Digital Proficiency Score, by UK region



Scotland's performance in the 'Use of technology by students at school' indicator is bolstered by the high frequency with which students use computers. In Scotland, students use computers seven times per week, compared to a national average of five times per week. Looking at the overall provision of computers at school, the East of England, the East Midlands, the North East and the South West perform the best, with an average of 8 students per computer. Meanwhile, teachers in London report an average of 11 students per computer – the weakest result in the country.

There is relatively little regional variation in the provision of technology to students for use outside of school hours, with all regions recording relatively low scores for this indicator. The average score among the regions was just 25, which suggests that all parts of the UK have some way to go in this area. The region scoring the highest was Scotland with a score of 29 whereas Wales scored the lowest at 21. In Scotland, just over a quarter of teachers indicated that at least some students are provided with a laptop or tablet that they can take home after school hours, compared to just 6% and 7% in the North East and Wales, respectively.

An area of weakness for many of the regions is in the provision of extra-curricular opportunities for students to develop digital skills. In every region and nation in the UK, at least a quarter of schools do not provide any extra-curricular opportunities for the

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development of digital skills. Wales leads the way in the provision of after school programmes to teach digital skills, with 28% of teachers stating that their school offered this service. These results indicate that there are numerous missed opportunities that schools could capitalise on to boost the level of digital training provided to students.

In all UK regions, more than a quarter of schools do not offer extra-curricular opportunities to develop digital skills

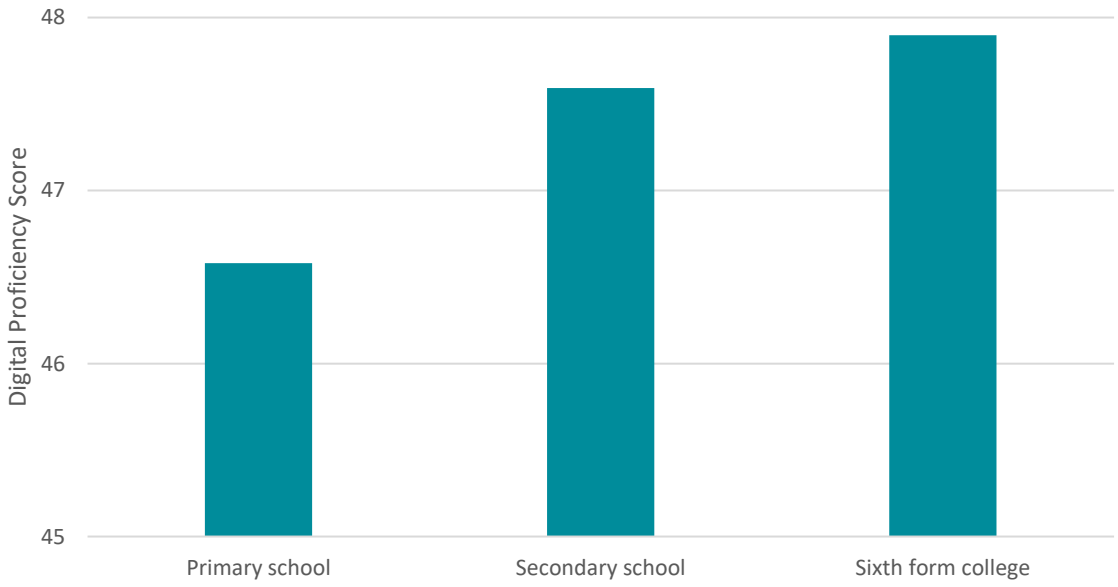
The results from the fourth indicator – which considers the digital access and proficiency of teachers and their related tasks – were relatively high across the different regions. All regions fall into the excellent category. The share of schools in which all teachers have ongoing access to a computer ranges from 67% in London to 77% in the East Midlands.

The South East region has the highest score when it comes to the digitisation of administrative tasks, while Scotland has the lowest score. Turning to the automation of administrative tasks, the highest performing regions are the South East and the West Midlands, while Scotland again scores below most other parts of the UK. This suggests that while many Scottish schools have excelled in the provision of technology to students, they have not been as successful in harnessing the potential of technology to lessen the administrative burden on teachers and school staff.

3.5 School phase

The survey results shed light on the levels of technological proficiency at different stages of the educational system. The average Digital Proficiency Score increases slightly for schools teaching older age groups, with an average score of 47 for primary schools compared to 48 for secondary schools and sixth form colleges.

Figure 5 Digital Proficiency Score, by school phase



The provision of technology to students for use at home is generally higher among schools later on in the educational cycle. Indeed, more than a third (36%) of sixth form colleges provide laptops or tablets to at least some of their students – double the average across all school phases. The share of schools that teach coding and programming as part of their core curriculum declines with the age of the students taught. One explanation for this could be that as students are given more choice surrounding the subjects they study, many opt out of technical computer programming courses. This suggests that more needs to be done to encourage students to continue to develop their digital skills as they progress through the education system.

The degree to which schools are offering online services such as an online library, online portals to submit homework and assignments is relatively even across the different phases of education. As briefly mentioned above, all levels of school phases score low on extracurricular activities in digital skills offered, indicating that there is plenty of opportunity to improve the services provided after school in digital skills training.

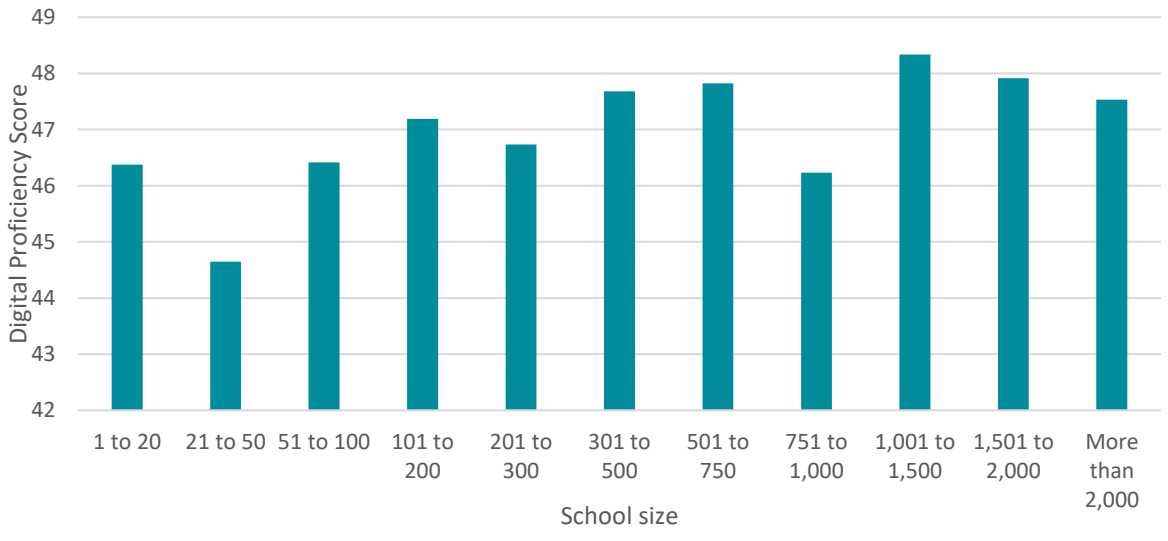
The scores in the fourth indicator are mixed across different phases of schooling. In general, the use of automation increases at schools that teach older students. For instance, seven out of ten teachers in the survey that work in secondary schools at least partially automate the sending out of notes and letters to parents or guardians, compared to less than six out of ten primary school teachers in the survey.

3.6 School size

Digital Proficiency scores can also be broken down by school size, which allows us to explore whether access to technology and digital skills training is affected by whether students attend a school with a relatively low or relatively high number of students. Smaller schools have on average a slightly lower overall score whereas bigger schools have a higher degree of technological proficiency.

One reason for this is that schools with more than 2,000 students score the highest when it comes to the digitisation and automation of administrative tasks. The relatively high volume of administrative activities that must be carried out in larger schools means that the initial costs associated with transferring tasks to digital and automated platforms are often small compared to the time savings that these investments will unlock.

Figure 6 Digital Proficiency Score, by school size



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Although in general larger schools have higher scores in the Digital Proficiency Scale, there are some areas where smaller schools perform better. Schools with more than 2,000 students have the highest number of students per computer with 18 student students per computer. In contrast, the lowest number of students per computer can be found in schools with 20 or fewer students, which on average have six students per computer. With that being said, the number of times students access a computer does not vary much across the different school sizes, suggesting that larger schools' computers typically have a higher utilisation rate than those in smaller schools.

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4. Teachers' perceptions of technology in schools

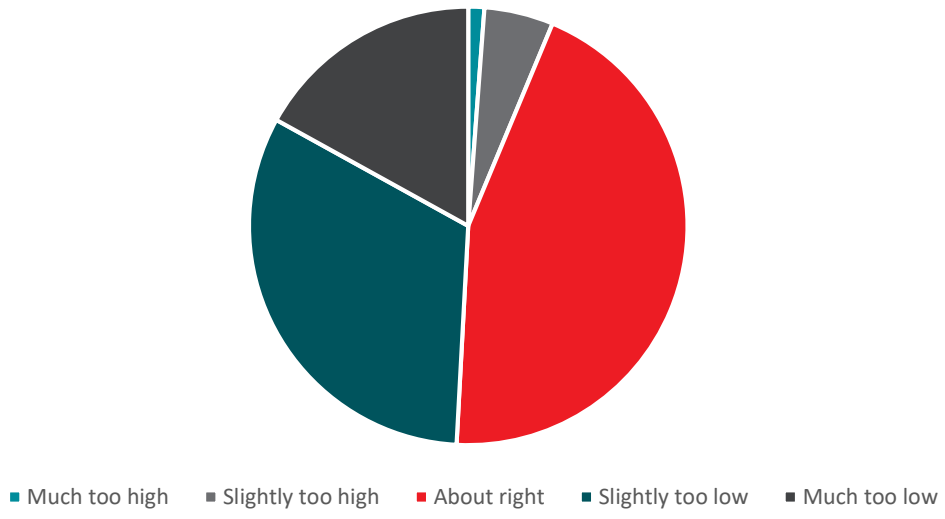
For technology to have the impact that it can in schools, buy in from teachers and staff is essential. As well as providing the data necessary for the development of the Digital Proficiency Scale described above, the survey of 2,000 teachers also provides a series of unique insights into teachers' perceptions of the use of technology in schools, including how this has impacted educational outcomes and whether the current levels of provision are up to scratch.

A resounding finding from the survey is that 50% of teachers feel that new technology introduced over the past five years has either greatly improved (8%) or somewhat improved (42%) educational outcomes at their school. This is ten times the share that stated that new technology introduced over the past five years had worsened educational outcomes. The positive effects of technology in schools have been most pronounced in Scotland and the South East, where 55% of teachers indicated that the introduction of new technologies had boosted educational outcomes at their school.

Given the benign impacts of technology described earlier in this report, it is unsurprising that there is an appetite among many teachers in the UK to expand the use of technology in schools. Indeed, only around one in twenty (6%) of teachers surveyed indicated that the use of technology in their school is too high, compared to nearly half (46%) that stated the use of technology is either slightly too low (30%) or much too low (16%). Meanwhile, a minority of teachers (42%) said that the use of technology in their school is about right.

For every teacher that feels the use of technology in their school is too high, there are 8 that feel the use of technology is too low

Figure 7 Share of teachers that feel the use of technology in their school is too high, too low, or about right



Interestingly, the share of teachers that feel the provision of technology in their school is adequate is lowest in the regions that score the highest in the Technological Proficiency

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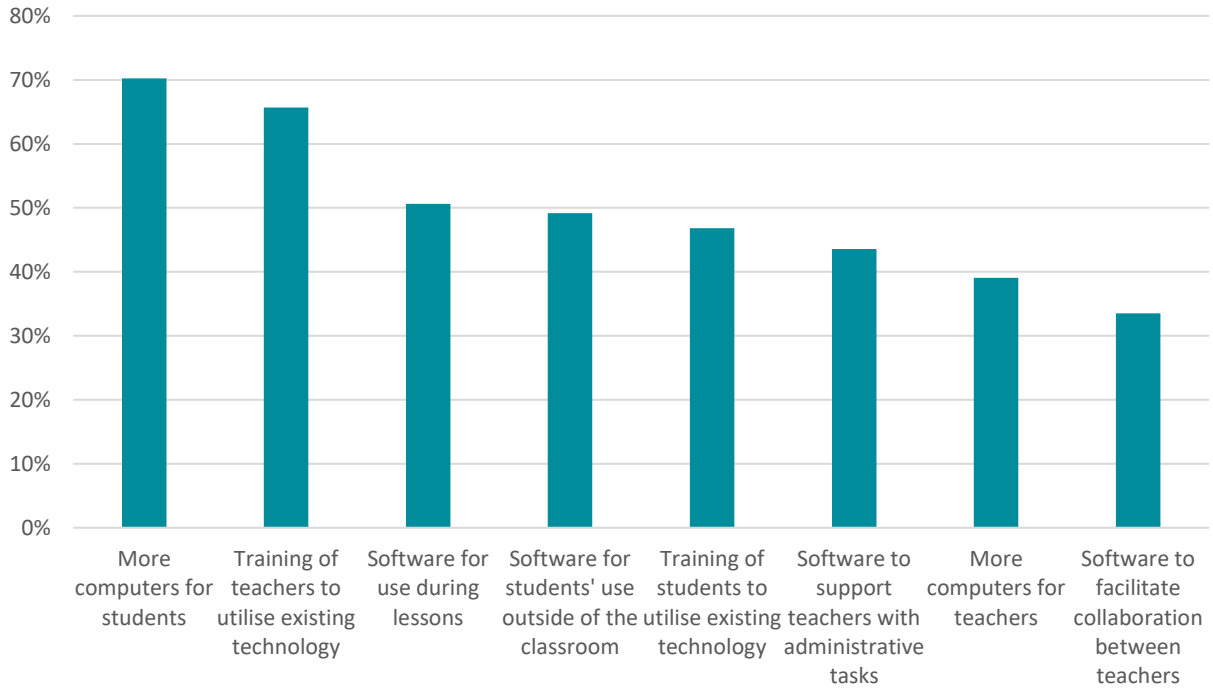
Scale. In Scotland and the East of England – the regions with the highest average scores in the Technological Proficiency Scale – the share of teachers that said the provision of technology in their school is adequate was 31% and 35%, respectively. This compares to a national average of 42%. Moreover, 53% of teachers in Scotland stated that their school's use of technology is too low, compared to 46% nationally. In schools that have embraced technology to a greater degree, teachers are able to witness more clearly the benefits that this can bring, thus forming their desire for an even higher use of technology in the future. By contrast, in schools with a more limited amount of technological integration, teachers are less likely to have an appreciation for the ways in which this can enrich the learning environment.

While technology is largely acknowledged to improve educational outcomes, the results of the survey suggest that a lack of training in some schools could prevent the full benefits from being realised. Indeed, nearly one in five (17%) teachers stated that they never receive training for the use of the technology available in their school. Among those that do receive technology related training, more than two-thirds (68%) get this training once a year or less often. This demonstrates that there is an opportunity to increase the level of technology in schools as well as to provide teachers with more training in new technologies so that this can be utilised in the best way possible.

Only a quarter of teachers receive training on the use of technology in schools more often than once a year, while 17% receive no training at all

For those teachers that feel that the provision of technology is too low in their school, the most common reason behind this is that the provision of computers to students is too low. Training to utilise existing technology in the school ranked as the second highest area where teachers feel their school could improve, followed by increasing the provision of software to support students' learning inside and outside of the classroom.

Figure 8 Areas for improvement cited by teachers that feel technological provision in their school is inadequate



5. Case Studies

5.1 School case study

Cebr interviewed Donna Shah, the digital technology lead and computing teacher based in a London school. Donna also mentors and supports students and school staff in implementing and using technology in school.

How does the usage of technology in schools benefit students and teachers?

At the school Donna has been working at, a significant amount of funding has been allocated to make technology available to students. Therefore, a range of equipment is used for teaching, including interactive white boards or active panels in all teaching areas and laptops which are distributed based on specific student needs, such as literacy or development issues. The school also a shared class set of tablets which are accessible by all and virtual reality (VR) equipment (set of 10).

One of the major benefits observed by Donna at the school is that children with behavioural issues are often more engaged in the class when using the technology, as they tend to be more familiar with the tools. This benefits the whole class, because there are fewer distractions from other children. Another way in which technology benefits students is through in-built translators in many types of software, such as the Microsoft package, meaning that for students who do not speak English as their first language, they can improve their understanding of the class by translating it into their mother tongue.

Many children find it easier to express themselves and can demonstrate their understanding to a greater depth by using technology creatively, for instance by making videos or podcasts. This type of learning and expression often also results in an improvement of children's soft skills, such as being able to collaborate with others and accept feedback on their work. Creations are also shared on social media which makes the students more excited about completing a project, because they know it will be made publicly available.

At Donna's school, technology is not just used to support student learning, but also to make processes more efficient, so staff can make better use of their time at work.

1. They use a text messaging system where they embed links with information such as the school newsletter or videos that the children made, to speed up communication with parents.
2. The school also uses Microsoft Forms, which can be used for administrative tasks such as sending out permission slips and keeping records of changes. Making communications available in a digital format can also help parents who don't speak English as a first language with translation.
3. Microsoft Teams is used, which speeds up administrative and communication processes for school staff, meaning that teachers can focus on spending their time with students.

Using these types of technology may initially require more time from teachers to understand how they work, but once they have become accustomed to using the technology available to them, the time savings can be considerable.

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Donna's recommendations

- Make use of the types of funding available, such as crowdfunding using RocketFund, for schools to purchase technology.
- Schools should consider renting technology before buying, to know if it will work well. When they do buy new technology, invest time in helping people understand how to use it.
- Create teams of digital champions in schools, who are responsible for implementing different technologies.

5.2 Tech company case study

Cebr spoke to Jennifer King, Schools Engagement Lead at Microsoft UK. Jennifer works with 30,000 schools to support teachers and leaders to improve student outcomes through the use of technology. This is achieved through various programmes and schemes which are run in the schools to showcase technology and educate teachers in how to use it.

How does Microsoft support schools to use technology?

Microsoft offers a range of technologies to schools, which can be used to support teaching and boost student outcomes. Most schools start out by using Office 365, and in particular Microsoft Teams. This enables collaboration among colleagues as well as between students and teachers, acting as a hub to set up meetings, share work and communicate. Another application which is accessed through Office 365 is OneNote Class Notebook, which enables schools to have a digital personal workspace for every student, a content library for hand-outs, and a collaboration space for lessons and creative activities, all monitored by a teacher on one digital platform.

Jennifer also cited the potential of technology to transform the learning experience, allowing students to use classroom space differently and become more creative. One example is 3D paint in Hololens, allowing users to draw in space with VR technology. Microsoft has also developed Minecraft Earth, which can be used as a teaching tool to bring teaching subjects to life in the classroom, using augmented reality.

In the future, Jennifer expects further transformation of classrooms, away from the current typical situation where students sit in rows of desks with devices in front of them all facing the front of the classroom. Instead Microsoft envisions a new environment that has students up, out of their desks being active and collaborating together on large surface hubs or tables that turn into computers.

A finding from the survey of teachers conducted for this report is that only a quarter of teachers receive training on the use of technology in schools more often than once a year. Microsoft have addressed this problem in part via the Microsoft Educator Center which is an online portal for educators, so they can share information on how to best use technology in the classroom, so as to improve student outcomes. There are also Microsoft Innovative Educators (MIEs) who train their own departments, schools, academies and UK regions as well as giving speaking engagements on behalf of Microsoft.

Jennifer considers the main barriers to uptake of technologies to be mindset. To implement a full overhaul of the usage of technology in a school is a major undertaking, and may take a significant amount of time, which could put educators off. With the many pressures that schools face, prioritising technology can be hard to achieve.

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Jennifer's recommendations

The UK government could consider modelling a curriculum update on the recent change the Welsh government made. The Welsh government put future ready skills, computer creativity, communication and collaboration at the heart of the new curriculum, meaning that schools were encouraged to embrace technology.

Additionally, the government needs to ensure that there is equitable access to broadband across all UK schools, so that all children have access to the internet and the potential to develop their digital skills.

5.3 Graduate recruiter case study

Cebr interviewed Faith Roberts, Managing Consultant at the Graduate Recruitment Bureau (GRB). Faith has worked as a recruiter for many years with experience in different industries including consulting, data analytics and engineering.

Do college and school leavers have the right skills to enter the workforce?

Cebr asked Faith what skills employers are looking for in recruits. As a minimum all professions require new employees from a graduate level to be able to use Microsoft Outlook for emails and meetings, and Microsoft PowerPoint. However, among more numerical, data-driven and analytical industries, Microsoft Excel is seen as a necessary skill, and many companies are looking for recruits with abilities such as using SAS statistical software or data visualisation packages such as Tableau. Within the IT sector, programming languages such as Java and Python are in high demand.

While being well versed in the most popular computer packages and software will help with being hired out of school and university, Faith highlighted that many businesses are willing to cross-train their employees in skills they are lacking, if they have relevant abilities elsewhere. In fact, over the past ten years, many companies have become less rigid in their technological requirements and have become more willing to train people in the exact skills they need.

Looking ahead, businesses will have to become more flexible with regards to technological training. As the range of software being used by companies increases, they cannot expect school-leavers and graduates to be able to operate the full suite of technology used at the specific company. However, while in education, it is important to acquire a minimum expected level of technological proficiency. This minimum will only rise, as more work-based processes become digitalised.

When employers are assessing candidates for a job, IT skills gained at school, such as a GCSE in ICT, are useful. However, when applying for a technical role, having qualifications in Maths and Physics are often well regarded as they indicate that the person is technically minded.

Faith added that developing technological ability and digital skills at an early age is important for children because as society and work becomes more digital, these skills become more important, and so teaching them at school creates more of a level playing field.

Faith's recommendations

As schools increase the amount of technology they use, the government should ensure that there is not too great of a disparity in opportunities for students at different schools to develop digital skills. As the uptake of new technologies can differ greatly

between regions and schools, some students may become more equipped for the future than others. Additionally, Faith highlighted the importance of promoting digital skills and attributes fairly between genders. Women are underrepresented in many STEM subjects, which is an issue many universities are attempting to address, but it is important for schools to also promote digital skills amongst girls.

5.4 HR consultant case study

Cebr interviewed Ken Batty, a HR consultant with 30 years of experience in the international technology sector. He works on HR projects around the world for a number of international companies. He is a trustee of Regent's University London and Vice Chair of Governors of Ark Acton High School.

Are schools using technology to prepare students for the labour market?

In order to consider how schools can use technology to prepare their students for the labour market, Ken explained which technological capabilities employers expect from workers. As a minimum, most employers in a professional workplace expect workers to be familiar with the Microsoft Office suite, although the depth of familiarity required depends on the exact role that a person has within a company. This highlights that schools should ensure that all their students are capable of using this software. Although many learn to use popular technologies at home, schools should ensure that all students are equipped with the basic skills required for a workplace.

Over the past ten years, expectations of the technological proficiency of school-leavers has undoubtedly increased. For instance, social media is now seen as an advertising tool for business.

Some technological skills are in particularly high demand from businesses, with data analysis being a skill required by many graduate-level jobs. With technologies such as Artificial Intelligence growing in popularity, demand for people with the skills to develop and use them will increase in the coming years. However, Ken noted that there is not an expectation from businesses that all potential employees should be able to use advanced technologies, and often a general degree can be more applicable to roles such as managerial positions.

Ken referenced the CBI/Pearson annual Education and Skills Survey report, which found in 2018 that most businesses want to see primary schools developing pupils' skills in science, maths and technology, with 82% ranking this among the three most important areas for action in primary schools. However, Ken also cited CBI findings that employers consider standards of literacy and numeracy as a cause for concern, with one in four not satisfied with the skills level of their potential employees. This is a significant issue that needs to be addressed while students are still at school. There is an opportunity for technology to be deployed as a tool for teaching in schools in order to increase literacy and numeracy skills and prepare students for the workplace. Furthermore, using the software required to succeed in a professional office environment, such as Microsoft Word or Excel, effectively, requires a decent level of literacy and numeracy and will actually improve the most relevant literacy and numeracy skills.

Ken's recommendations

It is recommended that schools increase the amount of teaching that they carry out using technology and the internet, in order to increase students' preparedness for the workplace, where most people are using the internet, emails and Microsoft software.

6. The way forward

The results of the Digital Proficiency Scale point to a high degree of variation in the provision and application of technology in schools across the country. While schools that have embraced new technologies in recent years have reaped the rewards, half of teachers in the survey feel that their school's current provision of technology is inadequate. This is undoubtedly a concerning finding and suggests that further progress is needed to expand the use of technology in schools. To this end, Cebr have distilled the insights from the survey of 2,000 teachers and in-depth interviews with industry experts into four key calls for action:

1. **Engage with the teaching community as new technologies are introduced:** while only a small percentage of teachers feel there is too much technology in schools, more than two in five (42%) believe the use of technology is currently about right. In order to maximise the effectiveness of new technologies, it is essential that they have the support of the teaching community. This can be achieved by expanding the provision of training to teachers (currently just a quarter of teachers receive training on the use of technology more often than once a year), as well as collaborating with staff on an ongoing basis to ensure that technologies are implemented in a way that aligns with the school's objectives.

2. **Continue to re-orient the curriculum towards developing digital skills for the future:** as technology evolves, routine tasks are increasingly likely to become automated, and workers will instead be required to interact with computers in a more involved and creative way. It is therefore essential that schools continue to shift their focus towards developing these deeper digital skills. While it is encouraging that most schools now teach computer programming, the fact that only one in five (21%) include topics relating to technologies of the future such as machine learning or artificial intelligence highlights that there is still progress to be made.

3. **Sharing information:** the interview with digital technology lead and computing teacher Donna Shah gives further insight into how teachers use technology to share information with colleagues, students and parents. Software programmes such as Microsoft Teams allows communication to increase between teachers and can speed up administrative processes which allows for teachers to spend more times with students. In addition to this, information sharing among teachers can also improve the technological and digital skills of teachers, as they are encouraged to share and learn from each other, which in turn leads to an increase in the quality of digital skills teaching in the classroom.

4. **Expand funding opportunities for schools:** while there are ways in which schools can upgrade their technological proficiency in a relatively cost effective way, many of the areas of weakness identified in this research require considerable investment in order to be addressed fully. Although the initial costs of technology can be steep, the feedback from teachers and the wider literature is that technology delivers a sizeable boost to educational outcomes, and in the longer term would result in higher workforce productivity.

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7. Conclusions

Over the past twenty years, digital technologies have moved from the periphery to the core of the UK's educational system, offering an array of benefits including a richer selection of learning materials, a streamlining of administrative tasks and a greater flexibility in tailoring content to the individual needs of students. This report develops a state of the nation picture of the level of digital proficiency in the UK's schools. It uncovers a high degree of variation in the provision and utilisation of technology in schools. The 49% of schools gauged to have either an inadequate or acceptable level of digital proficiency highlights that the benefits technology can bring to the learning process are not yet being fully realised in many institutions. This is not the case across the board however, with one in five UK schools being classed as having an excellent level of digital proficiency.

The verdict from teachers on the impact of technology is unambiguous. Indeed, 50% of teachers surveyed stated that new technologies introduced to their school over the past five years have improved educational outcomes, compared to just 5% who stated the opposite. Moreover, half of teachers believe that the level of technology in their schools is currently inadequate. Together, these results show not only that technology is having a positive impact in schools but that teachers see the potential for even further gains to be made in the future if schools can improve their digital proficiency.

Funding and investment are inescapable components of upgrading schools' technological provision. Many schools' digital proficiency scores are held back by the limited amount of technology that students are provided with for use outside of regular school hours. While addressing this would be costly, it is also important in ensuring that all students have an equal access to the benefits that technology can offer on their path through the educational system. This research additionally uncovers relatively cost-effective ways in which schools can boost their technological provision. For instance, one of the main ways in which teachers feel their schools can improve their technological proficiency is through expanding the training of staff to utilise the facilities that are on offer. Meanwhile, one of the insights derived from the expert interviews is the potential for schools to be more creative in how they fund new technologies, for instance through renting equipment or tapping into various funding schemes.

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