REFORM

Beyond gadgets

EdTech to help close the opportunity gap

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The arguments and any errors that remain are the authors' and the authors' alone.

Reform

Reform is an independent, non-party think tank whose mission is to set out a better way to deliver public services and economic prosperity. Our aim is to produce research of outstanding quality on the core issues of the economy, health, education, welfare, and criminal justice, and on the right balance between government and the individual.

Contents

Executive summary

This report illustrates the potential of education technology (EdTech) to help close the opportunity gap.[1] The paper highlights the different areas where EdTech could support disadvantaged pupils and the mechanisms for enabling schools to embrace the opportunities offered by technology.

The case for change

England urgently needs to address the inequality of opportunity for children of different backgrounds. The Social Mobility Commission has highlighted an "unfair education system" as one of the "fundamental barriers" to social mobility.[2] Current estimates suggest it will take 50 years for the attainment gap to close.[3] Unemployed adults are twice as likely to have weak literacy skills as those in full-time employment.[4] The gap is not just academic. In 2015, 55 per cent of those with no formal qualifications had never used the internet compared with 2 per cent of those with a degree.[5] Given the persistence of these gaps, more innovative approaches are needed to tackle the stark differences in opportunities between children from different backgrounds.

An appetite for EdTech

EdTech offers one source of the innovation needed. There is growing government interest in EdTech. In his inaugural speech as Education Secretary, Damian Hinds insisted "technology must have a role in our sector."[6] This attention is reflected in school ICT budgets, which are set to rise in 2018-19 following years of reductions.[7] The EdTech market is expanding, with over 1,200 EdTech companies in the UK alone.[8] Encouragingly, the EdTech debate is moving away from a focus on new gadgets to one that is prioritising evidence and outcomes. This shift towards efficacy makes it a promising source of innovation.

EdTech to level the playing field

Despite this seemingly flourishing market, the majority of schools are still struggling to make the best use of technology. EdTech has the potential to improve outcomes for every pupil, particularly those from disadvantaged backgrounds, but it needs to be harnessed.

Pupil experience can be enhanced through data insights, online assessment and learning, and artificial intelligence (AI). A school with high levels of deprivation in Greater Manchester saw the proportion of a year group reaching the expected reading standards rise from 71 to 83 per cent within just one year of using digital progress tests.[9] Data collected on pupils' attitudes to school have helped schools identify students who are disengaging and predict those who are most likely to stop attending, as much as 12 months in advance.[10] A trial in the US showed that 'adaptive' learning accelerated content understanding by 50 per cent and increased pass rates by one-third.[11] Another trial saw students with learning

1 Defined as the inequitable access to high-quality education, exposure to a wide range of careers and support in attaining those, depending on a young person's background. Kevin G. Welner and Prudence L. Carter, 'Achievement Gaps Arise from Opportunity Gaps', in *Closing the Opportunity Gap: What America Must Do to Give Every Child an Even Chance*, ed. Prudence L. Carter and Kevin G. Welner (Oxford, 2013).
2 Ibid.
3 Jon Andrews, David Robinson, and Jo Hutchinson, *Closing the Gap? Trends in Educational Attainment and Disadvantage* (Education Policy Institute, 2017).
4 The Reading Agency, 'Reading Facts', Webpage, 2018.
5 David Hirst, 'Mind the Gap: The Digital Divide and Digital Inclusion', *Significance*, 15 September 2015.
6 Department for Education, 'Education Secretary Opens Education World Forum', Speech, 22 January 2018.
7 Charley Rogers, 'BESA Report Reveals Increase in ICT Spending in Schools', *Education Technology*, 29 January 2018.
8 Department for Digital, Culture, Media & Sport, *UK Digital Strategy 2017*, 2017.
9 GL Assessment, 'CDS: Setting High Standards at Westfield Community School', 2017.
10 GL Assessment, 'Pupil Attitudes to Self and School (PASS)', 2017.
11 Nazeema Alli, Rahim Rajan, and Greg Ratliff, *How Personalized Learning Unlocks Student Success* (Educause Review, 2016).

disabilities improve results by 18 per cent, compared with a 5 per cent improvement for those taught the same content with traditional methods such as textbooks.[12]

With the right approach, technology could help reduce teacher workload and free up more teacher time. Given that schools in deprived areas often struggle most with the recruitment and retention of good teachers, this could disproportionately benefit disadvantaged pupils. The 2016 Teacher Workload Review Group recognised that, on balance, as long as purpose and implementation is properly considered, "electronic systems offer the prospect of quicker and simpler collection and almost real-time analysis and presentation".[13] One school cut the working day by 25 minutes.[14] Reducing the time spent on administration could give teachers more time to focus on other tasks, such as fostering pupils' social skills or one-to-one tuition, which would be transformative for pupils that begin school behind.

Schools must prepare all pupils for the future labour market. In less than 20 years, it is likely that 90 per cent of jobs will require digital skills. [15] Research has shown that technology in the classroom supports a range of hard and soft skills, such as creativity and innovation, research and information fluency online.[16] Technology can encourage independence. Shireland Collegiate Academy recorded that giving pupils material online in advance of a class contributed to a 16 per cent increase in GCSE grades and saw a 20 per cent increase in homework submittals.[17] Such approaches can help foster effective, resilient, life-long learning and equip every child with skills for the future.

EdTech and pupil premium spend

The pupil premium, allocated to schools based on their number of disadvantaged pupils, offers an opportunity to enhance the understanding of the use of EdTech to support disadvantaged pupils. Schools already need to provide annual plans for the spending of this funding, but these are published on individual school websites, making it almost impossible to gain an impression of where this funding goes or which interventions are proving most effective. A *Reform* sample of pupil premium reports found that only around 3 per cent of spending was devoted to EdTech and that schools largely continue to invest in traditional methods such as one-to-one tutoring and teaching assistants. Greater knowledge of schools' approaches, through requiring schools to submit plans directly into the online Analyse School Performance database, could help the Department for Education (DfE) and external researchers build a more comprehensive picture of the ongoing efforts to close the attainment gap.

Enabling EdTech

For technology to improve outcomes for the most disadvantaged pupils, DfE and Ofsted can support schools to embrace EdTech.

Schools can provide teachers with the skills to use technology effectively in the classroom. A poll of 500 primary and secondary schools in 2015 found that nearly half of teachers did not use technology available to them in the classroom due to a lack of training and uncertainty about effective integration.[18] Good practice exists, however.

12 Fatima E. Terrazas-Arellanes et al., 'Web-Based Teaching Can Improve Science Understanding for Struggling Pupils', *International Journal of Science Education* 40, no. 5 (February 2018).
13 Independent Teacher Workload Review Group, *Eliminating Unnecessary Workload Associated with Data Management: Report of the Independent Teacher Workload Review Group*, 2016.
14 Show My Homework, 'The Software Breaking Down Barriers', Webpage, 2018; Show My Homework, 'From Homework to Clockwork', Webpage, 2018.
15 Department for Digital, Culture, Media & Sport, *UK Digital Strategy 2017.*
16 Gayle Thieman, 'Using Technology as a Tool for Learning and Developing 21st Century Citizenship Skills: An Examination of the NETS and Technology Use by Preservice Teachers With Their K-12 Students', *Contemporary Issues in Technology and Teacher Education* 8, no. 4 (January 2008).
17 Shireland Collegiate Academy, *Flipped Learning: Improving Attainment and Progress through Homework* (OCR, 2014).
18 George Dotterer, Andrew Hedges, and Harrison Parker, *The Digital Divide in the Age of the Connected Classroom: How Technology Helps Bridge the Achievement Gap* (NetRef, 2016).

For example, the Olive Tree Primary School in Bolton dedicates weekly CPD sessions to, amongst other things, help the implementation of EdTech.[19]

Schools should be supported to embrace EdTech by guidance from central government. The DfE could partner with organisations such as the Learning Foundation to disseminate best practice and high-level guidance. It could also build on the DfE's current e-procurement channel, Redimo2, to create an online platform from which schools could browse products. Relationships between schools could be built up through virtual hubs, based on the Education Endowment Foundation's Families of Schools Database, which would allow schools to scope the most relevant technology for their needs. [20] Government should encourage these hubs by developing partnerships between 'Tech Expert' schools and schools that struggle most with EdTech and attainment gaps, based on a similar model to the Government's 'Maths Hubs'.[21] Government could look to recruit several private-sector providers to help fund these hubs.

Ofsted, which is responsible for school inspections and regulation, can provide support to help schools use EdTech to improve digital skills. Ofsted carries out schools survey reports alongside its main inspection programme and could produce a report on EdTech. Ofsted has highlighted the importance of digital skills in other areas of education, such as for apprenticeships, since 2017.[22] It is well placed to inform schools' efforts to equip every student with the skills they need to confront the future workplace, regardless of background or access to technology in the home.

Recommendations

1. Schools should be required to submit breakdowns of pupil premium spending to be displayed on Analyse School Performance. This would allow for the collection of data on pupil premium strategies, helping policy makers to understand common approaches, the impact of evidence-based guidance, and the extent to which innovative measures are applied to overcome the attainment gap.
2. Schools should provide Continuing Professional Development (CPD) as they are implementing EdTech. This should include sharing successful as well as failed EdTech approaches in the classroom.
3. The Department for Education should support the upscaling of an expert organisation, such as the Learning Foundation, to provide more guidance and support to schools, particularly those with more pupils from disadvantaged backgrounds.
4. The Department for Education's e-procurement channel, Redimo2, should be reframed to operate like the Digital Marketplace and expanded to include a dedicated stream for EdTech products. This would allow schools to see the full range of options available to them and encourage companies to be transparent about the efficacy of their products.
5. The Department for Education should identify and engage with 'Tech Expert' schools to celebrate their achievements and link them up with schools that are struggling to make effective use of EdTech to support disadvantaged pupils. It should look to recruit several private-sector providers to help fund these networks.
6. Ofsted should produce a survey report on how EdTech can be implemented to improve digital skills. The report should provide feedback to individual schools on how they can improve in this area, incentivising schools to ensure every pupil is equipped with the digital skills needed for the future.

19 Abdul Chohan, Interview with Co-founder and Director of The Oliver Tree Primary School, January 2018.
20 Education Endowment Foundation, 'Families of Schools Database', Webpage, 2018.
21 Maths Hubs, 'About Maths Hubs', Webpage, 2018.
22 Ofsted, *Further Education and Skills Inspection Handbook*, 2018.

Introduction

The state school education system in England is ripe for innovation. While more schools achieve good ratings in inspections, and standards are rising on several measures, many pupils continue to be left behind. [23] Technology in education presents an opportunity to help level the playing field. Used wisely, technology can be used as "a catalyst for change,"[24] driving the innovation needed.

England is struggling to provide equal opportunities for children at school and promote social mobility.[25] Children from disadvantaged backgrounds are more likely to attend underperforming schools, less likely to reach or go beyond expected standards and less likely to have access to good teachers and develop both the hard and soft skills to prepare them in the best possible way for the future.[26] The opportunity gap refers to the inequitable distribution of resources and opportunities which create large and stubborn gaps in achievement.[27] The Department for Education (DfE) has made it its priority to improve social mobility and ensure that every child and young person can achieve "the best of his or her ability regardless of location, attainment and background."[28]

Education technology (EdTech) has a role to play in schools' aim to raise attainment and improve opportunities for students upon the completion of primary and secondary education. First, EdTech has shown its potential to help schools reduce workload and give teachers a chance to devote more time to high-quality interactions, while also providing access to better information and tools to help improve pupils' progress and learning experience.[29] Second, as the use of technology has found its way to the core of most professions, and 90 per cent of jobs will require digital skills within the next 20 years,[30] digital tools can help develop the hard and soft skills needed to thrive in the future workplace. Outcomes for disadvantaged children could be transformed by embracing technology in learning and teaching.[31]

The responsibility to innovate rests on various actors in the education sector. Schools can provide teachers with the skills to use technology effectively in the classroom. However, they need guidance and support from the DfE and Ofsted to navigate the EdTech market and ensure it benefits all pupils, particularly those from disadvantaged backgrounds. This paper sets out to discover both the ways in which EdTech provides schools with the opportunity to overcome the most central challenge faced by the education system, the inequality in outcomes, and the mechanisms that could help them do so.

23 Department for Education, *Schools That Work for Everyone*, 2016.
24 Steven Higgins, ZhiMin Xiao, and Maria Katsipataki, *The Impact of Digital Technology on Learning: A Summary for the Education Endowment Foundation* (Durham University and Education Endowment Foundation, 2012), 4.
25 Social Mobility Commission, *State of the Nation 2017: Social Mobility in Great Britain*, 2017.
26 Social Mobility Commission, *State of the Nation 2016: Social Mobility in Great Britain*.
27 Kevin G. Welner and Prudence L. Carter, 'Achievement Gaps Arise from Opportunity Gaps'.
28 Department for Education, 'About Us', Webpage, 2018.
29 See Chapter Three.
30 Department for Digital, Culture, Media & Sport, *UK Digital Strategy 2017*.
31 The Department for Education defines pupils as being disadvantaged if they are or have been eligible for means-tested free school meals or if they are or have been looked after by a local authority. Shona Macleod et al., *Supporting the Attainment of Disadvantaged Pupils: Articulating Success and Good Practice* (Department for Education, 2015).

1
The case for change

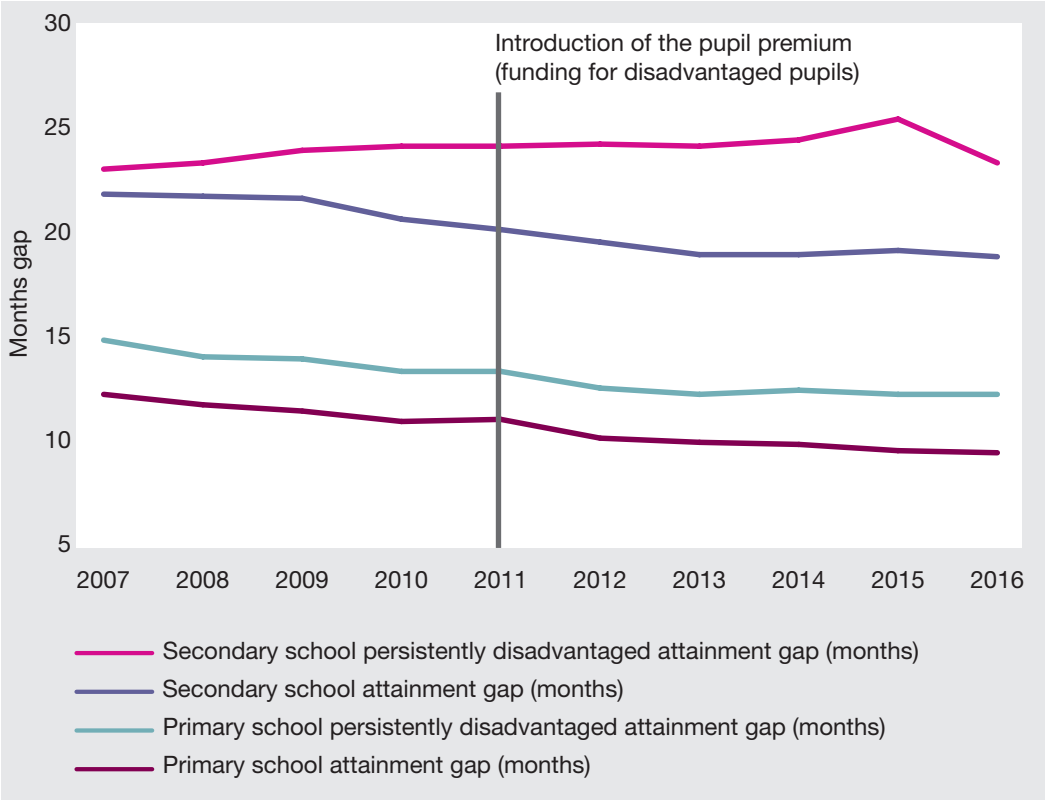
Increasing social mobility has been a priority for successive governments.[32] Structural barriers, such as educational attainment for the most disadvantaged in society, were termed by Prime Minister, Theresa May, in 2016 as a "burning injustice".[33] The Social Mobility Commission has highlighted an "unfair education system" as one of the "fundamental barriers" to social mobility.[34] More innovative approaches are needed to tackle the stark differences in opportunities between children from different backgrounds.

1.1 The gap

The problem of educational inequality between pupils from richer and poorer backgrounds is large and persistent, across primary and secondary education (see Figure 1). Children in England's most disadvantaged areas are 27 times more likely to go to an inadequate school than those in the most advantaged.[35] In 11 local authorities, disadvantaged pupils are more than two years behind in learning progress.[36] One in three disadvantaged children arrive at school below the expected level of development in language.[37] Not only are disadvantaged children aged five enrolling at schools with less developed key skills, such as basic numeracy and literacy, the attainment gap between them and others grows throughout their schooling.[38] Parents with lower literacy skills can struggle to support their children with homework, exacerbating intergenerational challenges of continued low attainment within less privileged families.[39] Schools are not currently successful in overcoming this challenge, meaning England has lower levels of literacy and numeracy among poorer young people than most comparable countries.[40]

32 Social Mobility Commission, *Time For Change: An Assessment of Government Policies on Social Mobility 1997-2017*, 2017.
33 Theresa May, 'Statement from the New Prime Minister Theresa May', Speech, 13 July 2016.
34 Social Mobility Commission, *State of the Nation 2016: Social Mobility in Great Britain*.
35 Ibid., xiv.
36 Andrews, Robinson, and Hutchinson, *Closing the Gap? Trends in Educational Attainment and Disadvantage*, 17–19. The total number of local authorities is 150.
37 Save the Children, *Ready to Read: closing the gap in early language skills so that every child in England can read well*, 2015, 3.
38 Education Endowment Foundation, *The Attainment Gap*, 2017.
39 National Literacy Forum, *Vision for Literacy 2025*, 2014.
40 Barnaby Lenon, 'Schools That Succeed with Disadvantaged Pupils', SecEd, 26 April 2017.

Figure 1: Attainment Gaps between disadvantaged and non-disadvantaged pupils over time by month



Source: Education Policy Institute, *Closing the Gap? Trends in Educational Attainment and Disadvantage*, 2017

NB. "Persistently disadvantaged" children are defined as those who are entitled to free school meals for 80 per cent of their time at secondary school.[41]

1.2 Skills for the future

The gap between children's skills in primary and secondary school limits the likelihood of disadvantaged children leaving school with the skills needed later in life. Research has shown poor literacy holds disadvantaged children back in science, a key subject for many lucrative career paths.[42] Unemployed adults are twice as likely to have weak literacy skills as those in full-time employment.[43] There is also a digital skills gap. Fifty-five per cent of those with no formal qualifications have never used the internet compared with 2 per cent of those with a degree.[44] The Nominet Trust found that an estimated 300,000 young people do not have basic digital skills and that "those least likely to have digital skills are also most likely to be facing multiple forms of disadvantage".[45] Those Not in Employment, Education, or Training (NEET) are more likely to come from the most disadvantaged backgrounds, with over half of those eligible for free school meals (FSM) being NEET at some point between the ages of 16 and 19.[46]

41 Andrews, Robinson, and Hutchinson, *Closing the Gap? Trends in Educational Attainment and Disadvantage*, 6.
42 Terezinha Nunes et al., *Review of SES and Science Learning in Formal Educational Settings* (Education Endowment Foundation and the Royal Society, 2017).
43 The Reading Agency, 'Reading Facts'.
44 David Hirst, 'Mind the Gap: The Digital Divide and Digital Inclusion'.
45 Samuel White, *Digital Skills in the United Kingdom* (House of Lords, 2017), 5.
46 Andrew Powell, 'NEET: Young People Not in Education, Employment or Training' (House of Commons Library, 24 August 2017).

There is a clear link between equipping pupils with the literacy, numeracy and, in the twenty-first century, digital skills they need and boosting their life chances.[47] The attainment gap outlined above can only ever be meaningfully addressed by making progress to improve the distribution of resources and opportunities open to pupils. The 'opportunity gap' therefore relies on going beyond attainment alone.

1.3 Funding for disadvantaged children

The current funding allocation for schools aims to address these long-term disadvantages for poorer pupils. Local authorities must use deprivation in school funding formulae,[48] although there is no specified proportion allocated on this basis. This means that councils nationally assign from as little as £500 to £4,500 per pupil as a deprivation factor.[49] In fact, across all authorities, there was a decrease in deprivation-allocated funding from 8.1 per cent in 2015-16, to 7.6 per cent in 2016-17.[50]

Since 2011, however, schools have had access to additional funding to tackle gaps in attainment. The pupil premium was implemented by the Coalition Government and aimed specifically at children who were eligible for Free School Meals (FSM).[51] In 2012, it was extended to any pupils who had been FSM eligible within the past six years, growing from 1.2 to over 1.8 million children.[52] In 2017, 1.9 million children were eligible for the pupil premium, which has been protected in cash terms since 2014-15.[53] It stands at £1,320 per primary school pupil and £935 per secondary school pupil, with a total value of £2.2 billion in 2016-17.[54]

Yet the introduction of the pupil premium does not yet seem to have made a significant difference in narrowing the attainment gap. Despite an overall 9.3 per cent improvement in the attainment gap between disadvantaged and other pupils,[55] in more than half of local authorities the attainment gap at secondary and primary school has gotten worse since its introduction.[56] Whilst there is no causal link for this widening gap and the pupil premium, it demonstrates that funding alone cannot close the gap. Failing to act could mean it takes as long as 50 years for the attainment gap to close.[57]

47 House of Commons Science and Technology Committee, *Digital Skills Crisis*, 2016.
48 Education Funding Agency, *Schools Block Funding Formulae 2016 to 2017: Analysis of Local Authorities' Schools Block Funding Formulae*, 2016.
49 Ibid.
50 Ibid., 8.
51 Department for Education, 'Government Announces Pupil Premium to Raise Achievement', Press release, 26 July 2010.
52 Department for Education, 'Cash Boost for Disadvantaged School Children', Press release, 24 September 2012.
53 David Foster and Robert Long, The Pupil Premium (House of Commons Library, 2017). In this research, the Pupil Premium refers exclusively to the so-called Deprivation Pupil Premium. Additional funding is also available for service children, children who are adopted from care or have been looked after by the local authority.
54 Ibid.
55 Department for Education, *National Curriculum Assessments at Key Stage 2 in England, 2016 (Revised)*, 2016, 19. Based on the Department for Education's Disadvantage gap index
56 Andrews, Robinson, and Hutchinson, *Closing the Gap? Trends in Educational Attainment and Disadvantage*.
57 ibid

2
An appetite for EdTech

The persistence of the attainment gap suggests that schools should explore new, innovative approaches to teaching and learning to make better use of funding such as the pupil premium.

One underexplored tool is EdTech. The EdTech market is rapidly growing, encompassing all types of technology which may be employed at a school: from classroom computers and whiteboards, to learning apps, tablets, administrative tools and progress tracking. Some of these have become part of life at most schools, with an estimated £900 million spent annually, sustaining over 1,200 UK providers.[58] It is also a Government priority. In his inaugural speech as Education Secretary this year, Damian Hinds, insisted "technology must have a role in our sector" to ease teacher workload, track pupil progress and "introduce them to whole new worlds".[59]

Despite this announcement, longer-term EdTech policy has been inconsistent and far behind developments in the EdTech market. This chapter provides an overview of the EdTech landscape, highlighting the extent to which EdTech has been prioritised by government, what this has meant for providers and how the debate is changing.

2.1 EdTech policy

From 1998 to 2011 government had a formal body in place to guide and facilitate the use of technology in schools. The British Educational Communications and Technology Agency (Becta) was created to save time and money, improve teaching and learning, and share best practice on the use of EdTech.[60] It aimed to do this by providing a research, evaluation and a procurement function. Addressing the attainment gap was an area of priority, and Becta provided over 12,000 grants to low-income families for computer equipment.[61] Between 2002 and 2011 it claimed to deliver savings the education system of £223 million.[62]

However, some have argued that Becta was too isolated in its recommendations and guidelines, stifling more innovative, teacher-led advances.[63] The collective IT procurement that Becta helped bring about compelled schools to use the same equipment, irrespective of school need or preference. The Laptops for Teachers programme exemplifies Becta's emphasis on getting hardware into education without asking what best can be done with them.[64] Its closure was announced by the Coalition Government in 2010 in a bid to save £80 million.[65] The programme showed the importance of careful implementation and that, without proper thought around application, technology will not solve the issue at hand.

The DfE has since reviewed the potential of EdTech, but initiatives have been short-lived. In 2014, a ministerial team from DfE and the Department for Business, Innovation & Skills asked the newly formed, independent Education Technology Action Group (ETAG) how digital technology could empower teachers and learners by enabling innovation. The group concluded that "the use of digital technology in education is not optional" and that "change is inevitable", as the disruptive impact of technology across all services continues to grow.[66] The group produced ambitious recommendations, such as the establishment of an overarching Continuing Professional Development (CPD) directorate supported by DfE, and for Ofsted to include use of technology as part of their accountability framework for schools.[67] However, these were not adopted.[68]

58 Private Equity Wire, 'The UK Ranks No1 in Edtech Venture Capital Funding in Europe', 19 June 2017.
59 Department for Education, 'Education Secretary Opens Education World Forum'.
60 Becta, 'Becta's Role', Webpage, 2010.
61 Becta, 'Becta's Results', Webpage, 2010.
62 Becta, 'Becta's Role'.
63 Charles Arthur, 'Will the Loss of Becta Give Schools a Fresh Chance to Make Technology Click?', *The Guardian*, 17 August 2010.
64 Becta, 'Becta's Results'.
65 Charles Arthur, 'Government to Close Becta', *The Guardian*, 24 May 2010.
66 Education Technology Action Group, *Our Reflections*, 2016.
67 Ibid.
68 Bob Harrison, 'ETAG: Eight Months and Still Waiting...', *SecEd*, 30 September 2015.

More recently, EdTech has risen up the agenda in Government. In 2016, a small EdTech team was again established in DfE, and an internal review was initiated, looking at the role of Government in supporting schools to realise the benefits of technology.[69] This year, the Secretary of State has made it a Government aim for technology to play a greater role in the education sector.[70]

2.2 The EdTech market

As EdTech policy has evolved, so has the market of providers. The annual Bett exhibition, an industry show for EdTech held in London, had 850 exhibitors in 2018.[71] A 2013 list of the 20 fastest growing and most innovative e-learning companies in Europe included 10 UK companies,[72] indicating that the UK has long been home to successful EdTech companies. While school spending on ICT has largely reduced since 2010, mainly due to the decline of purchasing expensive immobile hardware,[73] 2018-19 is set to see an increase in ICT spending of an estimated £16 million across primary and secondary schools.[74] According to the British Educational Suppliers Association (BESA), the increases are due to greater investment in 'system software', although the vast majority of school ICT spending is still devoted to computers.[75]

Drivers of EdTech demand vary across primary and secondary schools. The two most popular sources of primary school demand for EdTech are for parental communications, such as informing parents of their children's homework tasks, used by 27 per cent of primary schools, and learning management solutions, used by 18 per cent.[76] In comparison, secondary schools have more overall demand for EdTech solutions. The most in-demand EdTech function is classroom content which 39 per cent of secondary schools expressed demand for, with 35 per cent seeking EdTech for CPD/training.[77]

2.3 The EdTech debate

Developments in policy and the market have coincided with a change in debate. Discussions about technology in schools are moving away from a focus on new gadgets, such as interactive whiteboards or iPads, to one that prioritises evidence and outcomes. Since 2011, schools have been able to access guidance on how best to support the learning of their pupils through the Education Endowment Foundation's 'Teaching and Learning Toolkit'.[78] The independent charity collects evidence on educational interventions and assesses the extent to which they are effective as well as the cost of implementation.[79] The 'digital technology' entry concludes "moderate impact for moderate cost" but recognises that the impact is as varied as the number of different approaches.[80]

The toolkit preceded a shift in conversation towards evidence, outcomes and methods of implementation in education.[81] The meta-analysis of a number of research projects emphasises that while interventions surrounding technology generally have a positive impact, it is the way it is implemented and used that is crucial, as technology is "solely a

69 Nick Gibb MP, 'Technology: Education, Answer to Written Question' (HC4733, 24 July 2017).
70 Department for Education, 'Education Secretary Opens Education World Forum'.
71 Bett, 'About Bett', Webpage, 2018.
72 Department for Business, Innovation and Skills, *International Education: Global Growth and Prosperity* (HM Government, 2013).
73 Instructure Inc., *Driving Digital Strategy in Schools*, 2017.
74 Rogers, 'BESA Report Reveals Increase in ICT Spending in Schools'.
75 National Educational Research Panel and British Educational Suppliers Association, *Market Research: Information and Communication Technology in UK State Schools*, 2017.
76 BESA, *EdTech Survey: 2017*, 41.
77 National Educational Research Panel and British Educational Suppliers Association, *Market Research: Information and Communication Technology in UK State Schools*.
78 Education Endowment Foundation, 'Teaching & Learning Toolkit', Webpage, 2018.
79 Ibid.
80 Higgins, Xiao, and Katsipataki, *The Impact of Digital Technology on Learning: A Summary for the Education Endowment Foundation*.
81 The Economist, 'England Has Become One of the World's Biggest Education Laboratories', *The Economist*, 31 May 2018.

catalyst for change."[82] Professor Rosemary Luckin, Director of UCL EDUCATE, explained that the focus should be on how technologies can be designed specifically to improve teaching and learning. [83] Professor Luckin encourages practitioners to move from asking "can technology enhance learning?" to "how can we design technologies that enhance learning, and how can we measure that enhancement?"[84] This mindset, rejecting a 'whole or nothing' approach to EdTech, has brought efficacy arguments to the fore.

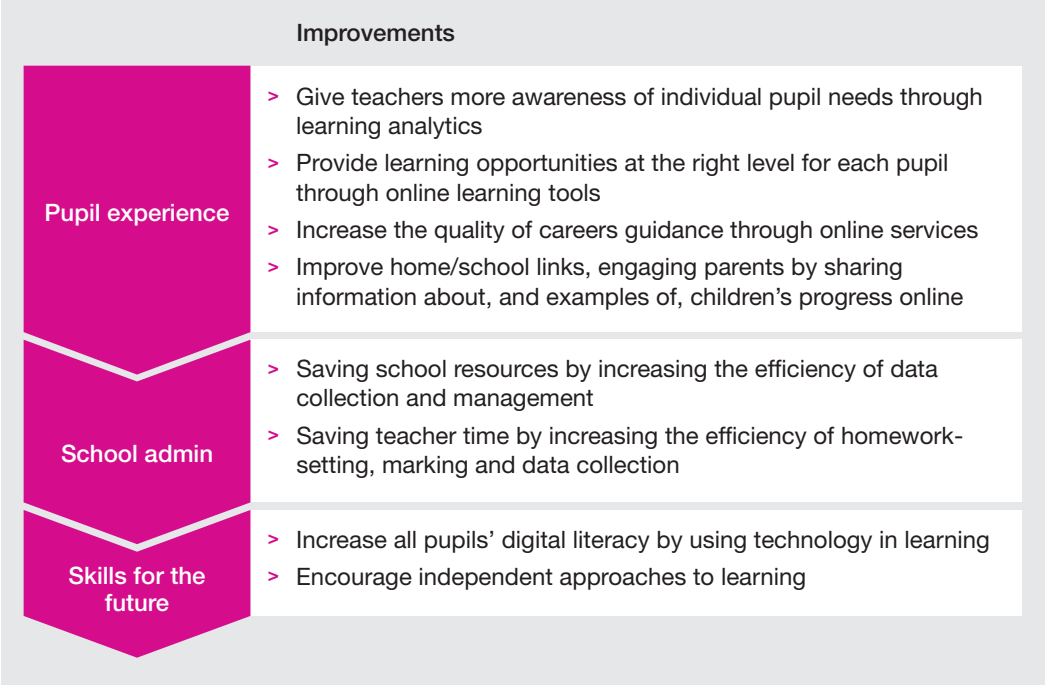
82 Higgins, Xiao, and Katsipataki, *The Impact of Digital Technology on Learning: A Summary for the Education Endowment Foundation*, 4.
83 Rosemary Luckin, *Enhancing Learning and Teaching with Technology. What the Research Says* (University College London: UCL Institute of Education Press, 2018).
84 Ibid.

3
EdTech to help close the opportunity gap

EdTech has the potential to help transform outcomes for pupils, especially those from disadvantaged backgrounds. In an interview for this paper, Sir Mark Grundy, Executive Principal of Shireland Collegiate Academy, argued that technology can be a "great leveller", allowing children from any background to strengthen skill sets, especially those needed for the workplace of tomorrow.

Technology can enhance the provision of education in multiple ways (see Figure 2). With the right devices, teachers can use EdTech to tailor teaching to individuals, personalise learning and offer a rounded education that involves parents and looks to the future.[85] Time spent on school administration could be reduced, helping increase teachers' time to spend with pupils.[86]Technology could encourage ownership over learning and generate skills for the future that would benefit all children, but particularly those who are less likely to gain these skills outside of the classroom.[87]

Figure 2: The potential of technology to drive improvements



3.1 Pupil experience

Teachers are time strapped and finding the time to focus on each child's personal development is a challenge. [88] With the right implementation, EdTech can transform teacher understanding of individual students through data collection and provide tailored online learning.[89] It can also improve pupil experience by supporting pupils at home and in choosing future career paths to give them a rounded education, something not always afforded to pupils from disadvantaged backgrounds.

85 GL Assessment, *Pupil Attitudes to Self and School Report 2016*, 2016; Benedict du Boulay et al., 'Artificial Intelligence and Big Data Technologies to Close the Achievement Gap', in *Enhancing Learning and Teaching with Technology. What the Research Says*, Ed. Rosemary Luckin (University College London: UCL Institute of Education Press, 2018); Education Endowment Foundation, 'Texting Parents', 2018.

86 GL Assessment, *Pupil Attitudes to Self and School Report 2016*; Benedict du Boulay et al., 'Artificial Intelligence and Big Data Technologies to Close the Achievement Gap'; Education Endowment Foundation, 'Texting Parents'.

87 House of Lords, *Select Committee on Digital Skills. Summary and Summary of Conclusions and Recommendations.*, 2015; Allison Allen and Richard Allen, 'Improving Learning through Engaging Spaces', in *Enhancing Learning and Teaching with Technology. What the Research Says*, Ed. Rosemary Luckin (University College London: UCL Institute of Education Press, 2018).

88 John Micklewright et al., *Teachers in England's Secondary Schools: Evidence from TALIS 2013* (Department for Education, 2014); National Audit Office, *Funding for Disadvantaged Pupils*, 2015.

89 Rosemary Luckin, *Enhancing Learning and Teaching with Technology. What the Research Says*; GL Assessment, *Smart Data for New Schools*, 2016.

3.1.1 Using data to improve teaching and assessment

Digital data collection can relieve teachers of bureaucratic tasks and transform support given to disadvantaged pupils.[90] In one survey, three quarters of teachers agreed that data have highlighted unknown pupil issues.[91] As Elliot Gowans of D2L, a software company behind virtual learning environments, has pointed out: "Teachers are time-strapped and often faced with a class of 20–30 students, all with different needs and capabilities. Technology that evaluates individual students' struggles and progression is key in combatting the traditional blanket teaching model where each child is taught in the same way, at the same pace."[92] Sophisticated data collection can enable teachers to deliver more personalised approaches by allowing teachers to pick up on some of the difficulties affecting disadvantaged pupils.

Assessment in schools could also be improved through data-driven technology. There is evidence of unconscious bias against disadvantaged pupils in formative assessment, meaning disadvantaged pupils are often not challenged enough because they are thought to be less capable.[93] The organisation #NoMoreMarking has created a new model for assessment, using scripts and getting many teachers to review work quickly and frequently, to understand how each child is doing and therefore how much challenge they can cope with, stretching every pupil to do their best.[94] Moving this approach online and having a database of papers could make this process even faster, enabling instant comparative marking, which has been put forward as a fairer approach to assessment,[95] while easing pressure on teachers. While bias will not be eliminated, this method is found to be fairer and could increase impartiality towards pupils from different backgrounds.

Some schools have expanded beyond the data gathered through academic assessments and focused on the views of students to identify where and why individual pupils are struggling. 'Pupil Attitudes to Self and School' is a survey monitoring nine factors of children's attitudes to school.[96] It aims to identify students who are disengaging and predict who are most likely to stop attending, as much as 12 months in advance.[97] It has highlighted the persistence of disadvantaged pupils' negative attitudes to education after moving to secondary school and found that these attitudes to learning can be changed if teachers identify the problem and adopt appropriate interventions. [98] In combination with attainment data, teachers can have access to profiles of all pupils providing them with detailed insight to increase the likelihood of all pupils being appropriately supported. [99]

3.1.2 Artificial intelligence and online learning

With an average of 20 pupils in a classroom it is difficult for teachers to give pupils the kind of one-to-one attention that would help boost motivation and attainment to mitigate the attainment gap.[100] The use of artificial intelligence (AI)[101] or online learning in teaching can both provide personalised support for students, and free up teacher time to allow them to provide nuanced, individualised feedback.[102]

90 John Higton et al., *Teacher Workload Survey 2016: Research Report* (Department for Education, 2017).
91 GL Assessment, *Smart Data for New Schools*.
92 Rianna Newman, 'Roundtable: Elliot Gowans', *Education Technology*, 20 August 2017.
93 Robert Coe, 'Teacher Assessment: Trust, Professionalism, Balance, Quality', Lecture, 2015.
94 Chris Wheadon, 'Judge Infit', *The No More Marking Blog*, 19 February 2018.
95 No More Marking, 'What Is Comparative Judgement?', 2018.
96 GL Assessment, *Pupil Attitudes to Self and School Report 2016*.
97 GL Assessment, 'Pupil Attitudes to Self and School (PASS)'.
98 GL Assessment, *Pupil Attitudes to Self and School Report 2016*.
99 Ibid.
100 Richard Adams, 'School Class Sizes in England "Rising Due to Funding Cuts"', *The Guardian*, 8 March 2018.
101 AI describes a set of advanced technologies that enable machines to do highly complex tasks effectively – which would require intelligence if a person were to perform them. See Professor Dame Wendy Hall and Jérôme Pesenti, *Growing the Artificial Intelligence Industry in the UK* (Department for Digital, Culture, Media & Sport and Department for Business, Energy & Industrial Strategy, 2017); Rose Luckin, Mark Griffiths, and Laurie B. Forcier, *Intelligence Unleased: An Argument for AI in Education* (Pearson, 2016).
102 Rosemary Luckin, *Enhancing Learning and Teaching with Technology. What the Research Says*.

The use of online learning in schools has unlocked possibilities for bespoke learning approaches and has been particularly useful for disadvantaged pupils. One randomised control test found that web-based teaching can improve science results for struggling pupils.[103] Results for students with learning disabilities and English language learners improved by 18 per cent and 15 per cent respectively, while those taught the same content with traditional methods, such as textbooks, only saw a five per cent improvement.[104] Online learning can also help counter the effects of regular school absence,[105] which is higher among both students eligible for FSM and those with special educational needs.[106] One trial in Washington DC showed lower absenteeism for classes using blended approaches, which combine online learning with traditional classroom methods.[107]

AI can take personalised support even further. AI in education refers to technology that provides insightful, adaptive and personalised teaching to students.[108] The technology chooses appropriate tasks for individual learners and reacts dynamically to how they deal with these tasks. A recent analysis of six meta-reviews of AI systems found that they have produced better learning outcomes than comparative human methods.[109] The only teaching which produced better results was one-to-one human teaching, which is not a luxury afforded to many schools (see box).[110] The research suggests that the provision of personalised and adaptive feedback to students can enhance students' engagement, motivation and self-confidence, all of which could help increase opportunities for disadvantaged students.[111]

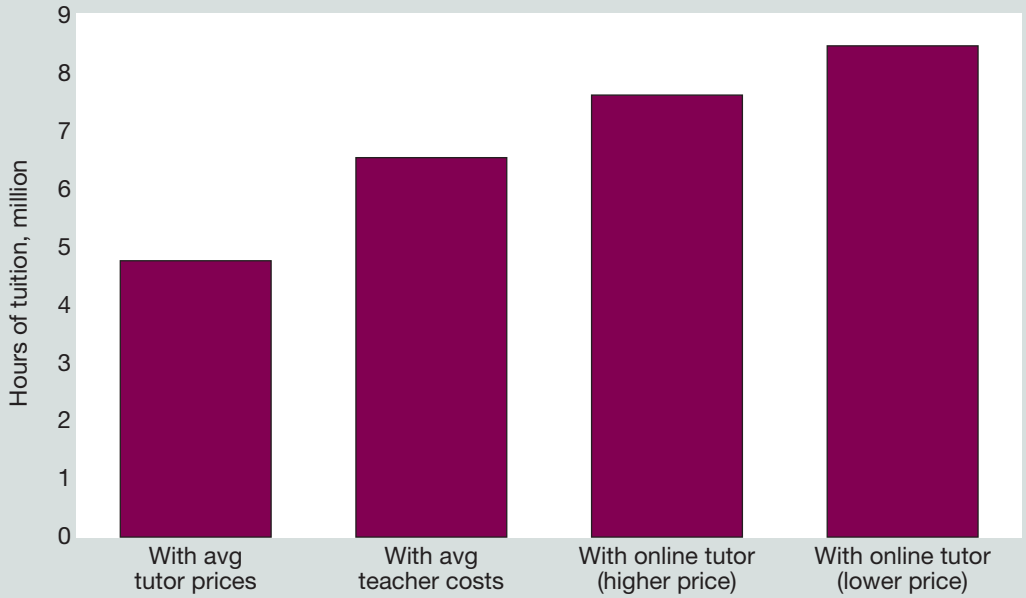
One-to-one tuition: Cost efficient approaches to improving pupil experience

One-to-one tutoring is a well-researched intervention, deemed by the Education Endowment Foundation (EEF) to have "moderate impact for high cost."[112] Many schools spend a large percentage of pupil premium budgets to support disadvantaged pupils using this approach. In our sample of 40 schools, spending devoted to one-to-one lessons make up around seven per cent of the budget (see Figure 4, Chapter 4). Its cost means that schools either have to reduce spending elsewhere, or choose only a small number of pupils to receive lessons. If schools do not use their own teachers to provide tuition, many also struggle to recruit tutors locally and to plan the logistics if they are coming from afar.

An alternative approach has been trialled by some schools, using video conversation apps to link pupils with tutors. This adds flexibility, but it also offers an opportunity to save. MyTutor, which provides such an online tutoring service, charges £20 per hour of tutoring compared to a national average of freelance tutors at around £32.[113] Another company, Tutorfair, lets tutors set their own prices, and a search for online tutors at GCSE level found a substantial number at £18 or below.[114] The EEF estimates that allocating a teacher to provide one-to-one tuition costs around £23.3 per hour.[115]

103 Fatima E. Terrazas-Arellanes et al., 'Web-Based Teaching Can Improve Science Understanding for Struggling Pupils'.
104 Ibid.
105 Thomas Arnett, 'Can Technology Solve the Achievement Gap?', *Christensen Institute*, 23 October 2015.
106 Department for Education, 'New Data Highlights True Picture of School Absence', Press release, 19 October 2011.
107 Julia Freeland Fisher, 'Is Blended Learning Closing Achievement Gaps?', *Christensen Institute*, 8 April 2016.
108 Benedict du Boulay et al., 'Artificial Intelligence and Big Data Technologies to Close the Achievement Gap'.
109 Ibid.
110 Ibid.
111 Ibid.
112 Education Endowment Foundation, 'One to One Tuition', Webpage, 2018.
113 MyTutor, *Impact Report 2017*, 2017.
114 Tutorfair, 'Find the Right Tutor for You', Webpage, 2018.
115 Education Endowment Foundation, 'One to One Tuition'.

Figure 3: Hours of tuition covered by current pupil premium spend by different approaches



Sources: Education Endowment Foundation, 'One To One Tuition', Webpage, 2018; Philip Kirby, *Shadow Schooling: Private Tuition And Social Mobility in the UK* (The Sutton Trust, 2016); Tutorfair, 'Find The Right Tutor For You', Webpage, 2018; MyTutor, *Impact Report 2017*, 2017; Rachael C, 'Closing The Attainment Gap: Revolutionary New Tutorfair App', *Tutorfair Blog*, 13 September 2017.

If the proportion spent on one-to-one tuition in the sample of 40 schools is reflected nationwide, almost £153 million is spent every year. According to the EEF, short regular sessions over a focused period of time are the best way to achieve the optimum impact. If using the smallest estimate of what is needed to make good progress (1.5 hours a week for six weeks), one million additional hours of tuition could enable an extra 110,000 children to make between three and five months' extra progress. On the highest estimate of what is needed to make such progress, an additional 33,000 pupils could still be helped every year. In the case of 3 million extra hours of tuition, the number of pupils making significant progress could increase by over 300,000.

The evidence on the efficacy of one-to-one tuition is based on in-person interactions and effects of online tuition may not therefore be fully equivalent. MyTutor, however, have conducted an initial assessment of impact suggesting that students receiving online tuition for more than one term make three times greater progress than those who receive none.[116] The Tutorfair Foundation (a charitable arm of Tutorfair) have developed a free on-demand Maths tutoring app, so far launched in five schools with high levels of deprivation.[117] In the first small evaluation of the app, seen by *Reform*, all of the students using it thought it could help them improve GCSE grades, and would on average like to access a tutor through it twice a week.[118]

116 MyTutor, *Impact Report 2017.* MyTutor consulted with UCL EDUCATE to ensure the validity of the evaluation in the report.
117 Rachael C, 'Closing the Attainment Gap: Revolutionary New Tutorfair App', *Tutorfair Blog*, 13 September 2017.
118 Ibid.

3.1.3 Home support

Research has indicated that support at home is one of the single greatest predictors of pupil achievement.[119] For many, however, particularly those from disadvantaged backgrounds whose children are more likely to need extra support, there are significant obstacles to parental engagement, such as working multiple jobs, language barriers, or being in education themselves.[120]

Technology can help improve engagement. For parents for whom time, finance or language barriers stop them coming directly to the school and hearing from teachers about their child's work, remote communication can be transformative. Research has shown that initiatives as simple as texting parents about their child's progress has a positive impact on attainment, improving progress in English and Maths by one month.[121] It can also increase efficiency. Passmores Academy estimated that Piota, an app designed to improve parental engagement, saved two to three hours of administration time a week, through its ability to instantly send bulk messages to parents and act as a reference point for school news and upcoming events.[122] This could save teachers working in disadvantaged schools valuable time to focus on the development of the pupils.

3.1.4 Careers advice

While careers advice is now a statutory requirement in schools, the quality is patchy, and disadvantaged pupils, who do not necessarily get advice from home, often miss out. A 2015 survey of employers by the Confederation of British Industry found that 77 per cent of respondents felt careers advice for young people was not good enough.[123] A recent report on careers and enterprise provision in England found schools meeting on average 1.87 of the eight benchmarks that have been developed to encourage good practice in careers provision at school.[124] Young people with uncertain career aspirations by the age of 16 are more likely to become NEET, particularly those who face obstacles due to their socioeconomic background.[125]

Online tools in schools could help spread high-quality careers guidance. According to Michelle Thomas, Executive Headteacher at Woodberry Down Primary School, technology has increased the aspirations of disadvantaged students and has "opened up an absolute belief that the impossible is possible." Online apps can pool together high-quality information, advice and guidance on university courses, apprenticeship schemes and career opportunities, tailoring information to the interests of the child. After implementing the careers app 'Unifrog' at Cheltenham Bournside College, and enabling all students to use the app at school, the school reported an increase in the percentage of students making university applications.[126] The app was also able to analyse projected destinations data for current students, giving all teachers the knowledge needed to support individual students without a significant time cost. Technology helps equalise the support and information given to children at critical points in their education and can therefore play a role in reducing the attainment gap as children move to the next steps of their education.

119 See Cabinet Office Social Exclusion Task Force: Short Studies, *Aspiration and Attainment amongst Young People in Deprived Communities*, 2008; Lorraine Dearden, Luke Sibieta, and Kathy Sylva, 'The Socio-Economic Gradient in Early Child Outcomes: Evidence from the Millennium Cohort Study', *Longitudinal and Life Course Studies* 2, no. 1 (February 2011).
120 The Children's Partnership, *Empowering Parents through Technology to Improve the Odds for Children*, 2010.
121 Education Endowment Foundation, 'Texting Parents'.
122 Chris Moss, 'How Schools Save Time with a Piota App', *Piota*, 2 May 2017.
123 Rosa Marvell, 'Careers Advice Is Crucial, but What Can Schools Do?', *Institute for Employment Studies*, 20 June 2016.
124 The Careers & Enterprise Company, *State of the Nation 2017: Careers and Enterprise Provision in England's Schools*, 2017.
125 Marvell, 'Careers Advice Is Crucial, but What Can Schools Do?'
126 Unifrog, 'Case Study: Cheltenham Bournside College', Webpage, 2017.

3.2 School administration

Digital tools can help reduce administrative workloads, giving teachers time to focus on other tasks, such as fostering pupils' social skills or one-to-one tuition, which would be particularly transformative for disadvantaged pupils.

Teachers continue to spend large amounts of time on administration, and those in disadvantaged areas are under particular pressure.[127] The annual staff attrition rate in the most deprived secondary schools is 23 per cent, compared with 16 per cent in the most affluent,[128] and the rate of qualified teachers leaving state-funded schools increased from 9.3 per cent of the qualified workforce in 2011 to 9.9 per cent in 2016.[129] A 2017 National Audit Office report identified workload as a key barrier to the retention of teachers, cited by 67 per cent of school leaders.[130] Stress which may be induced by a heavy workload seems to be closely linked to the risk of teachers leaving the profession.[131]

Digital tools could help with workload, potentially helping encourage teachers to stay on in disadvantaged schools and freeing up time to focus on every pupil. The software 'Show My Homework', for example, allows teachers to set homework through an app, visible to all members of staff, as well as to pupils and parents. This creates transparency, and increases accountability, but it also lets the teaching workforce share resources easily, as teachers can give the same homework for different classes. Moreover, it can save time in lessons as shown by one school that managed to cut five minutes from each lesson, reducing the day by 25 minutes in total.[132] Software products that allow teachers to set online homework and tasks in class are often quoted as sources of significant time saving for marking and data collection as well.[133] One school using Show My Homework, for example, claimed to have saved 95 per cent of school leader time spent quality assuring homework set by teachers.[134]

Technology should be user-friendly to ensure time is saved. Currently UK teachers only receive four days of Continuing Professional Development (CPD), on average, and have little time to navigate new systems.[135] The 2016 Teacher Workload Review Group recognised that, on balance, as long as purpose and implementation is properly considered, "electronic systems offer the prospect of quicker and simpler collection and almost real-time analysis and presentation".[136] Furthermore, in the long term, technology can free up time for CPD. Research by the OECD found that while English teachers were spending more time than many on marking and administrative tasks, they were near the bottom of the international table for CPD.[137] Digitising administrative tasks could shift this, allowing teachers to spend greater time on both CPD and the development of individual pupils (see section 5.1).

127 Micklewright et al., *Teachers in England's Secondary Schools: Evidence from TALIS 2013*.
128 Rt Hon Nick Clegg et al., *Commission on Inequality in Education* (Social Market Foundation, 2017).
129 National Audit Office, *Retaining and Developing the Teaching Workforce*, 2017.
130 Ibid.
131 Shannon Ryan et al., 'Leaving the Teaching Profession: The Role of Teacher Stress and Educational Accountability Policies on Turnover Intent', *Teaching and Teacher Education* (August 2017) 66.
132 Show My Homework, 'The Software Breaking Down Barriers'.
133 Lisa Jarmin, 'Will You Survive the AI Revolution?', in *Guide to Ed Tech* (TES, 2018); Century, 'Case Studies', Webpage, 2017.
134 Show My Homework, 'From Homework to Clockwork'.
135 Peter Sellen, *Teacher Workload and Professional Development in England's Secondary Schools: Insights from TALIS* (Education Policy Institute, 2016).
136 Independent Teacher Workload Review Group, *Eliminating Unnecessary Workload Associated with Data Management: Report of the Independent Teacher Workload Review Group*.
137 Sophie Bailey, 'Can Tech Save Teachers Time?', *LinkedIn*, 23 January 2017.

3.3 Skills for the future

One of the key problems for educators today is equipping pupils with the skills they need for an unpredictable workplace.[138] Many young people from disadvantaged backgrounds are leaving school with fewer opportunities than their peers.[139] A study of young people in care showed that, aged 19, 41 per cent were NEET, compared with 15 per cent of all individuals in this age group.[140] These groups do not have access to the same network of contacts that others may gain through parents and often lack certain soft skills, such as confidence and motivation.[141] Schools need to ensure that every pupil can pursue the career of their choice.

3.3.1 Digital skills

Digital skills refer to technological skills but also softer ones, such as responsiveness, innovation and lifelong learning, all of which are increasingly needed to participate in a digitally connected society.[142] In 20 years, 90 per cent of jobs will entail some element of digital skills.[143] Office jobs requiring basic software skills, such as Microsoft Excel or Microsoft Word, pay 13 per cent more than those that do not.[144] A 2017 House of Lords report concluded that no child should leave school without basic digital literacy.[145]

Digital tools in the classroom could help to enhance digital skills. The 2016 *Digital Learning and Teaching Strategy for Scotland* stressed embedding digital technology across the curriculum to help pupils develop a level of general and specialist digital skills.[146] Research has shown that technology in the classroom supports a range of hard and soft digital skills, such as creativity and innovation, research and information fluency online.[147] An EEF report highlighted that teacher training for EdTech focuses on teaching pupils digital skills, rather than improving pedagogy, suggesting digital skills are already seen as a priority.[148]

Digital tools must be carefully integrated to help develop the right skills in an equal way. Professor Rosemary Luckin suggested putting measures in place in schools to ensure that technology is available to every child to foster digital skills.[149] It has also been recommended training teachers to integrate digital tools into a class of students who may not have access to the internet or mobile devices at home.[150] Schools must also have broadband to ensure digital access, which the 2017 Digital Strategy has pledged to address. [151] With the right policy in place, technology can help teach digital skills to groups who may not find traditional approaches intuitive, such as those with learning difficulties.[152] Technology, therefore, can help equip every child with the basic digital skills needed for employment.

138 Rosemary Luckin and Kristen Weatherby, 'Learning Analytics, Artificial Intelligence and the Process of Assessment', in *Enhancing Learning and Teaching with Technology. What the Research Says*, Ed. Rosemary Luckin (University College London: UCL Institute of Education Press, 2018).
139 All-Party Parliamentary Group for Education, *How Well Do Schools Prepare Children for Their Future?*, 2017; Commons Select Committee, 'Fourth Industrial Revolution Inquiry Launched', Webpage, 1 May 2018.
140 Learning and Work Institute, '"Equity in Education Requires Early Intervention" – Impact and Challenges of Low Literacy and Numeracy Levels amongst Young People in England', Webpage, 2 February 2016.
141 All-Party Parliamentary Group for Education, *How Well Do Schools Prepare Children for Their Future?*
142 Sarah Grand-Clement, *Digital Learning. Education and Skills in the Digital Age* (RAND Europe, 2017).
143 Department for Digital, Culture, Media & Sport, *UK Digital Strategy 2017.*
144 Burning Glass Technologies and Capital One, *Crunched by the Numbers: The Digital Skills Gap in the Workforce*, 2015.
145 House of Lords, *Select Committee on Digital Skills. Summary and Summary of Conclusions and Recommendations.*
146 Smarter Scotland Scottish Government, *Enhancing Learning and Teaching through the Use of Digital Technology. A Digital Learning and Teaching Strategy for Scotland*, 2016.
147 Thieman, 'Using Technology as a Tool for Learning and Developing 21st Century Citizenship Skills: An Examination of the NETS and Technology Use by Preservice Teachers With Their K-12 Students'.
148 Higgins, Xiao, and Katsipataki, *The Impact of Digital Technology on Learning: A Summary for the Education Endowment Foundation*.
149 Allison Allen and Richard Allen, 'Improving Learning through Engaging Spaces'.
150 Dotterer, Hedges, and Parker, *The Digital Divide in the Age of the Connected Classroom: How Technology Helps Bridge the Achievement Gap*.
151 Department for Digital, Culture, Media & Sport, *UK Digital Strategy 2017.*
152 Julia Taylor, 'How Technology Can Help Dyslexic Learners Help Themselves?', *Jisc*, 5 November 2015.

3.3.2 Independent learning

Helping all students become independent and self-motivated learners can prepare them for a changing future workplace.[153] Research has shown that children from disadvantaged backgrounds feel less control over and less involvement in their learning, limiting their ability to be independent learners.[154] According to Ben Newmark, Head of Humanities at New College school in Leicester, discussion is important, but independence in the classroom is critical, explaining that "very regular and immediate help can contribute to learned helplessness with children coming to believe they are unable to work on their own at all."[155]

While these comments were not in relation to EdTech, technology can create new opportunities to improve independent learning for those from less affluent backgrounds. 'Flipped learning' is a style of learning where pupils are given work at home on computers or tablets prior to lessons.[156] Analysis of a number of ICT Mark assessment reports found that the use of this technique changes the way pupils and teachers interact and give children more confidence and pride in their learning.[157] Shireland Collegiate Academy, which ensured all pupils had access to a tablet with the subject content prior to class, recorded that this approach contributed to GCSE grades increasing by 16 per cent, homework submittals by 20 per cent, and increased numbers of good to outstanding lessons observed by Ofsted.[158] Using technology, therefore, can help foster independent and confident learners, equipping every child with the right skills to open opportunities to thrive after school.

153 Rosemary Luckin and Kristen Weatherby, 'Learning Analytics, Artificial Intelligence and the Process of Assessment'.
154 Donald Hirsch, *Experiences of Poverty and Educational Disadvantage* (Joseph Rowntree Foundation, 2007).
155 Ben Newmark, 'Am I Allowed to Sit at My Desk?', *Bennewmark*, 16 February 2018.
156 Peter Rudd, *Flipped Learning Evaluation* (Education Endowment Foundation, 2017).
157 Allison Allen and Richard Allen, 'Improving Learning through Engaging Spaces'.
158 Shireland Collegiate Academy, *Flipped Learning: Improving Attainment and Progress through Homework*.

4
EdTech and pupil premium spend

There is limited access to information about how schools are directing their funding for EdTech, and whether this is directed strategically to support disadvantaged pupils, as detailed school budgets are not publicly available.

The pupil premium, however, offers an opportunity to enhance our understanding of the use of EdTech to support disadvantaged pupils. The pupil premium is a source of funding targeted specifically at the progression of disadvantaged pupils and can be used for innovative approaches to reduce the opportunity gap.[159] Schools are allocated £1,320 per eligible primary school pupil and £935 per eligible secondary school pupil and have autonomy over how this extra funding is spent.[160]

Most schools publish 'pupil premium strategies' annually, outlining how they are planning to spend this additional resource and their approaches to improving the performance of disadvantaged pupils. Although many schools will fund EdTech initiatives through funding other than the pupil premium, pupil premium strategies provide the best available insight into schools' approaches to closing the opportunity gap.

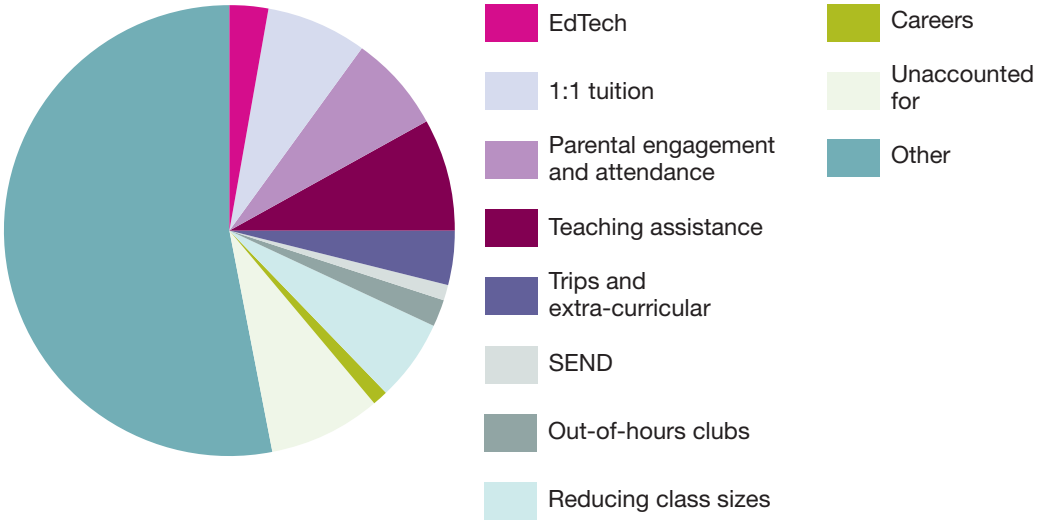
4.1 Lack of detail

Pupil premium reporting is generally inconsistent and provides little opportunity to analyse common approaches.[161] Reports do not follow a single format, and the level of detail varies widely across the sector. A *Reform* sample of 40 schools, equally divided between primary and secondary schools with low and high proportions of disadvantaged students, makes this clear.[162] When interviewed for this report, James Weatherill, CEO at Arbor Education, argued that the way the pupil premium is being spent is so varied that it almost defies classification. Arbor provides schools and multi-academy trusts with benchmarking analysis and management information systems, but Weatherill says that when schools report their pupil premium spending it breaks down into thousands of different spending categories.

Some categorisation of pupil premium spend is possible, however (see Figure 4). It suggests that only around three per cent of the spending accounted for is devoted to EdTech, ranging from online learning programmes to learning analytics and iPad clubs. Meanwhile, seven per cent is spent on 1:1 engagement and eight per cent on teaching assistants, both of which are high-cost interventions according to the EEF.[163] As shown in Chapter 3, EdTech could be a more cost-effective option. The results also demonstrate the multitude of interventions trialled, with over 50 per cent in the 'other' category. Whilst the freedom to trial new interventions is welcomed, it highlights the need for a mechanism that holds schools to account for using the pupil premium in ways that provide good value for money.[164]

159 Department for Education and Education Funding Agency, 'Pupil Premium: Funding and Accountability for Schools', Guidance, 2017.
160 Ibid.
161 Norfolk Audit Services, *Pupil Premium in NCC Maintained Schools*, 2017.
162 See Appendix for a list of the selected schools.
163 See Education Endowment Foundation, 'Teaching Assistants', Webpage, 2018; Education Endowment Foundation, 'One to One Tuition'.
164 Jonathan Clifton, 'Schools Must Learn to Spend the Pupil Premium Wisely', *The Guardian*, 20 April 2011.

Figure 4: Sample pupil premium spend



Source: *Reform* analysis of pupil premium statements from 40 selected primary and secondary schools, equally divided between high and low proportions of disadvantaged pupils (see appendix for the list of schools).

NB. The 'unaccounted for' category consist of the pupil premium statements where spending is not broken down into any categories at all. The 'other' category consist of spending that is either grouped in ways that consist of several of the other subcategories or fit into none of them

4.2 Gaining insight from the pupil premium

While the freedom for school leaders to decide on pupil premium approaches is positive as it allows schools to cater for their pupils' specific needs, the disparity of reporting frameworks make it difficult to evaluate the impact of the policy interventions. Tighter reporting standards and a central collation of pupil premium spending reports could provide schools with better information on the impact of different policy interventions and help them to get the best value for money from their spending. To achieve this, schools should be asked to divide spending into categories, consulted on by the DfE. The Analyse School Performance website, which provides performance analysis data to support local school improvement,[165] should, alongside data on the performance of disadvantaged pupils, have breakdowns of schools' individual pupil premium budgets.

Even with infrequent inspections, this would make pupil premium practices more transparent and easily comparable. Inspectors, school leaders, governors and other interested parties could compare performance and approaches between schools. There should also be a function for searching specific interventions. If, for example, a school is interested in using tracking software to improve the performance of disadvantaged pupils, they should be able to identify all pupil premium statements where such a method has been applied and use their evaluation for their own learning.

Recommendation 1

Schools should be required to submit breakdowns of pupil premium spending to be displayed on Analyse School Performance. This would allow for the collection of data on pupil premium strategies, helping policy makers to understand common approaches, the impact of evidence-based guidance, and the extent to which innovative measures are applied to overcome the attainment gap.

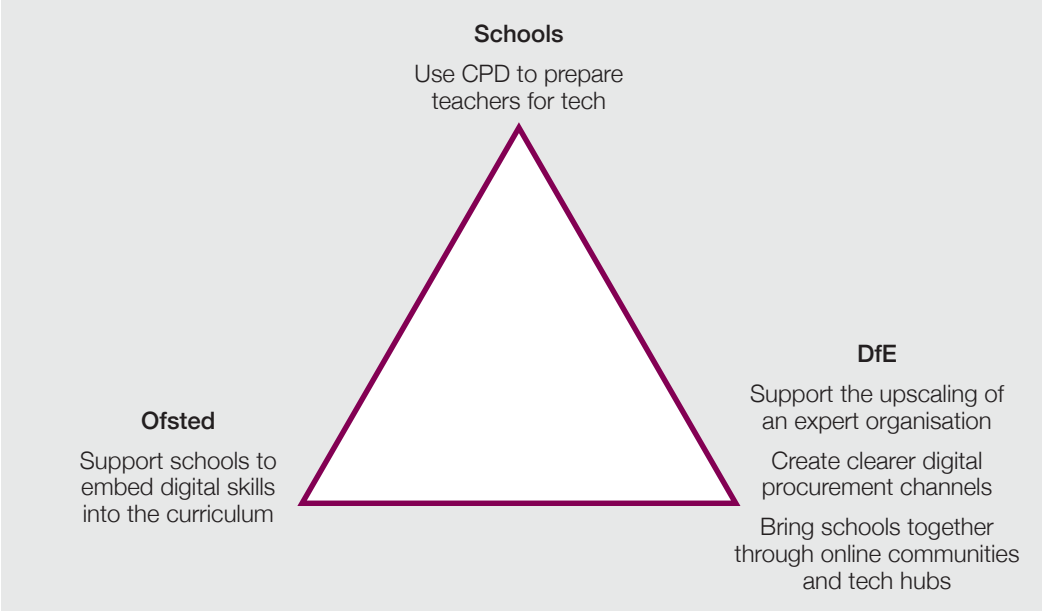
165 Department for Education, 'Analyse School Performance', Webpage, 2018.

5
Enabling EdTech

Although schools are investing in technology and there are pockets of excellent usage across the country, there is a long way to go before EdTech can be used to support all pupils and help narrow the opportunity gap. Enabling EdTech requires a balance of support and encouragement to ensure schools are adopting technology in the best possible way.

Responsibility for implementing EdTech sits at a number of different levels (see Figure 5). Schools should support Continuing Professional Development (CDP) to help teachers embed technology into their practice and equip students with necessary skills. The DfE can provide guidance to help schools choose the right technology and provide clarity over how to purchase products. Finally, to ensure every child is equipped with adequate digital skills, Ofsted could support schools to teach digital skills through a thematic review on how best to foster digital skills for every child, and comments on what schools need to do to achieve this.

Figure 5: Levers for implementing EdTech



Creating the right environment to enable EdTech demands various actors to play their part and work together to produce a first-class, tech-enabled education system that works for everyone.

5.1 Schools: preparing teachers for tech

Education professionals need to be trained to make the most of the benefits of technology outlined in Chapter 3. Research suggests that thousands of pounds worth of technology is sitting in schools unused.[166] If schools are to invest money into EdTech, CPD must also be prioritised to ensure teachers are supported to implement technology effectively.

Schools have struggled with effective implementation of technology. In 2015, the OECD indicated that teachers find it difficult to get the most out of EdTech, meaning schools risk investing in tech apparatus that fails to deliver.[167] A 2017 survey by the British Educational Suppliers Association (BESA) showed that nearly 30 per cent of primary schools felt teachers were not using EdTech content solutions effectively, a number which rises to nearly 50 per cent for secondary schools.[168] The same survey indicates that teacher

166 Josie Gurney-Read, 'Classroom Technology "Rarely Used" by Half of Teachers', *The Telegraph*, 24 November 2015.
167 OECD, *Students, Computers and Learning: Making the Connection*, 2015.
168 National Educational Research Panel and British Educational Suppliers Association, *Market Research: EdTech in English Maintained Schools*, 2017.

willingness and knowledge of the benefits of EdTech were the two most significant barriers to implementing EdTech.[169]

Research suggests teachers need more support to implement technology and understand what works. Professor Dame Alison Peacock, CEO at the chartered College of Teaching, recently called for a culture shift in schools so teachers "engage with others about what is working in their classrooms" and build knowledge of successes through sharing good practice.[170] This should be applied to EdTech. A poll of 500 primary and secondary schools in 2015 found that nearly half of teachers did not use technology available to them in the classroom due to a lack of training and uncertainty about how to integrate it effectively.[171] In an interview for this paper, co-founder and Director of The Olive Tree Primary School, Abdul Chohan, explains that training needs to be "regular and constant" to allow teachers to make mistakes with technology and continue to learn. In another interview, Michelle Thomas also emphasised training and the sharing of failed experiments as being key to ensuring good pedagogy is maintained with EdTech.

CPD does not have to mean unnecessary burdens on teachers' time. The Sutton Trust has shown that it is through good quality professional development that real improvements in teaching and attainment take place.[172] Any efficiency gains made from the implementation of digital administrative tools (see section 3.1.2) could be reinvested in short regular knowledge-sharing sessions between teaching staff. Efficient online CPD is another option. The Career Colleges Trust has launched a programme of digital CPD, breaking it into bitesize courses with the aim of decreasing time commitments.[173] In this way, CPD could be realistically introduced to effectively embed EdTech into teaching and learning.

Recommendation 2

Schools should provide Continuing Professional Development (CPD) as they are implementing EdTech. This should include sharing successful as well as failed EdTech approaches in the classroom.

5.2 Department for Education: encouraging good EdTech

While there is an abundance of EdTech to choose from, this is not enough to ensure that schools employ the right kind of technology and avoid gimmicks. There is a lack of knowledge of the opportunities offered by EdTech, leading to scepticism in some schools.[174] Even though there are ways to create a more censored internet environment, for example, one interviewee for this paper argued that using mobile technology in the classroom opens a "can of worms" around extremism, pornography and cyber-bullying. Another interviewee explained that technology is often sold as the means to success and so, when the latest gadgets have failed in the past, scepticism has increased.[175] Despite benefits in some applications, therefore, EdTech in the classroom is sometimes considered not worth the risk.

While schools continue to invest a great deal in technology, navigating the EdTech market independently can be hard.[176] A 2017 survey by BESA showed that only 35 per cent of senior school leaders feel there is sufficient information to assess the efficacy of EdTech,

169 Ibid.
170 House of Commons Education Committee, *Oral Evidence: Supply of Teachers*, HC 327 (The Stationery Office, 2016).
171 Dotterer, Hedges, and Parker, *The Digital Divide in the Age of the Connected Classroom: How Technology Helps Bridge the Achievement Gap*.
172 The Sutton Trust, *Developing Teachers: Improving Professional Development for Teachers*, 2015.
173 Career Colleges, 'Career Colleges Trust Wins Contract to Develop Digital Skills Training Courses', Webpage, 30 November 2016.
174 Richard Garner, 'Top head says money spent by schools on 'fad' iPads could have funded 8,000 teachers', *The Independent*, 19 January 2015.
175 David Benady, 'Is Technology Delivering in Schools? Our Panel Debates', *The Guardian*, 4 July 2017.
176 Jess Staufenberg, 'Experts Demand "National Strategy" for Tech Procurement as School Spending Drops', *Schools Week*, 28 November 2017.

and only 38 per cent indicated that EdTech met the objectives originally set.[177] Greater guidance and support from the DfE, expert organisations and other schools can encourage schools to embrace technology in the best way.

5.2.1 Helping schools choose

Schools can be helped to adopt the right technology by better access to independent information. According to one expert interviewed for this paper, "the DfE is the least respected source" when it comes to EdTech information, which may reflect remnants of negative feelings surrounding Becta (see section 2.1). Another interviewee, school director Abdul Chohan, acknowledged that government departments do not want to be seen to endorse certain brands, but also argued that school leaders "cannot risk buying technology that doesn't work." With an emphasis on autonomy in the English school system and reported lack of appetite for the provision of an approved list of suppliers,[178] the sector must identify other ways of guiding schools.

The DfE could partner with organisations such as the Learning Foundation to disseminate best practice and high-level guidance. The Learning Foundation, previously the e-Learning Foundation, is a charity that sets out to support digital access and technology-enabled learning for all children, particularly to close the attainment gap.[179] The organisation collates evidence and provides individual support to schools as well as an online toolkit.[180] This form of guidance is helpful for schools with less digital capacity. According to the Learning Foundation's Chief Executive, Paul Finnis, in an interview for this paper, its main function is to help schools identify the problems they are trying to solve and guide them to find the best technological solutions. Often, Finnis argues, schools can be well served by observing the practices of their peers and nearby neighbours. But schools, he maintains, need to fully consider whether they are seeking to overcome the same obstacles and need to ensure that they adapt what they learn to suit their own needs.

Providing schools with bespoke support relies on an expert organisation which has the capacity to reach out to schools looking for the right EdTech interventions or those in need of support. The DfE should, therefore, support the extension of an independent organisation, like the Learning Foundation, to reach more schools quicker. This would require targeted funding to help it support schools with high levels of disadvantage. DfE could also disseminate information about the opportunity provided by the independent organisation to widen its impact, especially in disadvantaged areas. Often schools in more deprived areas require more support and reach out less because they are more strapped for time, not seeing it as a priority. It would help to have an independent organisation with the resources to reach out to such schools and spend the necessary time to help them improve the use of digital tools.

Recommendation 3

The Department for Education should support the upscaling of an expert organisation, such as the Learning Foundation, to provide more guidance and support to schools, particularly those with more pupils from disadvantaged backgrounds.

177 BESA, *EdTech Survey: 2017*.
178 Instructure Inc., *Driving Digital Strategy in Schools*.
179 Learning Foundation, 'Our Strategy & Principles', Webpage, 2018.
180 Learning Foundation, 'Toolkit', Webpage, 2018.

5.2.2 Digital procurement

Even when digital expertise is present within schools, navigating the EdTech market can be difficult. As illustrated in section 2.2, the market of EdTech providers has rapidly expanded in the past few years and the UK has over 1200 EdTech companies.[181] Providing clearer procurement channels for buying products will support schools in making the best purchasing decisions, and encourage EdTech companies to make a stronger, more evidence-based case for their products.

Government can provide this clarity through smart approaches to digital procurement. DfE already uses the e-procurement channel Redimo2. [182] However, instead of operating like a marketplace, it works as an auction site, meaning while entry costs for suppliers are low, buyers lack the information to make a comparative judgement of what products work best for them.[183] This requires more effort from schools to define exactly what they are seeking and from suppliers to bid and meet this expectation. In a dynamic market like EdTech where software innovations are common, and open to a variety of uses, this rigid model is inappropriate. The lack of information available to schools about their options also means it is harder to compare existing products on offer.

Instead Redimo2 could be reframed to operate like the Government's Digital Marketplace, an online platform from which buyers can pick from a list of goods and services.[184] This would allow schools to browse an extensive selection of providers with a transparent idea of cost, and clearer understanding of benefits of different technologies. It also reduces the investment risk for schools as government can monitor credit scores to ensure companies are financially sound and perform random spot checks to ensure services match their online description, as it does for the Digital Marketplace.[185]

Creating a visible platform for schools to browse products could help incentivise EdTech providers to put forward a stronger efficacy case for their products to attract clients. The platform could encourage providers to offer descriptions of their services to better compete with other sellers. For schools, this would provide a central place where they can clearly understand the benefits of different technologies and find those that best fit their needs.

Recommendation 4

The Department for Education's e-procurement channel, Redimo2, should be reframed to operate like the Digital Marketplace and expanded to include a dedicated stream for EdTech products. This would allow schools to see the full range of options available to them and encourage companies to be transparent about the efficacy of their products.

5.2.3 Bringing schools together

A single organisation such as the Learning Foundation will only be able to provide a limited amount of direct guidance to individual schools. To scale up the degree of help offered to schools with the implementation of digital tools, networks between schools could be encouraged. While schools are already guided by each other, decisions with regards to technology are largely guided by anecdotal evidence from schools nearby, and not formalised mentoring relationships. According to Mark Grundy, good EdTech schools are often more likely to be approached for guidance by schools abroad rather than those in the same region.

181 Private Equity Wire, 'The UK Ranks No1 in Edtech Venture Capital Funding in Europe'.
182 Department for Education, 'Procurement at DfE', Webpage, 2018.
183 Ibid.
184 Alexander Hitchcock and William Mosseri-Marlio, *Cloud 9: The Future of Public Procurement* (Reform, 2016).
185 GOV.UK, 'G-Cloud Suppliers' Guide', Webpage, 6 March 2018.

Relationships could be fostered through virtual hubs, based on the EEF's Families of Schools Database, which connects schools that are facing similar challenges to help them learn from each other.[186] These hubs could allow schools to scope the most relevant technology, procurement assistance or staff CPD to fit their needs. Schools with a high proportion of absenteeism amongst disadvantaged pupils, for example, could engage online to see how others have successfully approached similar issues. In Scotland, hundreds of online communities have been created through Glow, which provides a wide range of web services and resources for education in a safe, online environment.[187] Glow is used by schools across the country to share resources and engage professionally online. In 2015, it launched the National Numeracy and Mathematics Hub to help teachers share innovative approaches to education.[188] Between 2015 and 2016, over 8,000 teachers participated in its online broadcasts, which covered a range of approaches to learning and teaching maths.[189]

Government could help create these communities by encouraging the development of partnerships between 'Tech Expert' schools and schools that struggle the most with EdTech and attainment gaps. To find the best schools, the DfE could be guided by Naace, a professional association concerned with the use of ICT in education, which awards 'ICT marks' to schools with good use of technology, based on a self-review framework and an assessment visit.[190] It could also approach schools with strong relationships with individual companies, such as Microsoft Showcase Schools or Apple Training Centres.[191]

The model would be similar to the Government's 'Maths Hubs', where expert schools are chosen by DfE to lead other schools and spread expertise, and in return receive support from a number of strategic advisors, such as Ofsted, and have access to expertise from other hub schools.[192] Schools that are selected as 'Tech Experts' would benefit from positive exposure, access to the exclusive network of other expert schools, as well as innovators, EdTech academics and investors through regular events. This status will also increase the chances of being approached by international schools for expertise, creating a potential additional source of income. The 'Tech Expert' scheme would need to be backed by DfE funding. The Government's 'Maths Hubs' cost £11 million, and the recently announced 'Centres of Excellence for Literacy' are set to cost £26 million.[193] Government could look to recruit several private sector providers to help fund these hubs.

Recommendation 5

The Department for Education should identify and engage with 'Tech Expert' schools to celebrate their achievements and link them up with schools that are struggling to make effective use of EdTech to support disadvantaged pupils. It should look to recruit several private sector providers to help fund these networks.

5.3 Ofsted: supporting digital skills

Digital tools can provide the opportunity to improve digital skills (see section 3.3.1). Given the importance of these skills for tomorrow's workforce, it is critical that schools are aware of how to develop digital skills within the curriculum.

186 Education Endowment Foundation, 'Families of Schools Database', Webpage, 2018.
187 Glow. Digital Learning for Scotland, 'Glow Services'.
188 Smarter Scotland Scottish Government, *Enhancing Learning and Teaching through the Use of Digital Technology. A Digital Learning and Teaching Strategy for Scotland*.
189 Ibid.
190 Naace, 'ICT Mark', Webpage, 2018.
191 Microsoft, 'Microsoft Schools Programmes', Webpage, 2018.
192 Maths Hubs, 'About Maths Hubs'.
193 Department for Education, 'Network of 32 Maths Hubs across England Aims to Raise Standards', Webpage, 1 July 2014; Department for Education, 'Boost for School Standards with Primary Literacy Drive', Webpage, 6 January 2018.

Ofsted is well placed to provide this clarity and direction for schools. Ofsted carries out school survey reports alongside its main inspection programme to look at specific issues or topics, such as 'languages and literacy' and 'alternative school provision'.[194] It should produce a survey report on EdTech and how it can be implemented well to improve digital skills. Considering Ofsted's influence, the publication of a report could alleviate headteachers' fears of the Ofsted response when pursuing methods to improve digital skills. Furthermore, the report would be based on best practice and therefore involve reviewing schools to assess the current state of play in this area and how it can be improved. Ofsted could therefore provide schools with personal feedback to help them improve digital skills within their school.

Ofsted and government have already emphasised the importance of students leaving school with adequate digital skills. Ofsted have looked at digital skills in other areas of education, such as for apprenticeships, since 2017.[195] The House of Lords digital skills committee has called for digital literacy to be treated as a third core subject, alongside reading and writing."[196] If the Government is serious about its ambition to "create a world-leading digital economy that works for everyone",[197] it should ensure schools are emboldened to equip every student with the skills they need to confront the future workplace, regardless of background or access to technology in the home.

Ofsted could encourage ways of embedding digital skills into the curriculum in the report, without adding great burden to schools and teachers. The 'Literacy from Scratch' project, for example, created in 2012 in response to the Government's planned introduction of Computing, has had ongoing and international success for providing a simple way to teach and learn computer programming skills across different subjects in schools.[198] The cross-curricular scheme is supported by an easy-to-use, cost-free support website for teachers. These projects would help schools ensure all students develop the skills they need for the future world of work, regardless of background.

Recommendation 6

Ofsted should produce a survey report on how EdTech can be implemented to improve digital skills. The report should involve providing feedback to individual schools on how they can improve in this area, incentivising schools to ensure every pupil is equipped with the digital skills needed for the future.

194 Ofsted, 'Ofsted Schools Survey Reports', Webpage, 18 October 2017.
195 Ofsted, *Further Education and Skills Inspection Handbook*.
196 House of Commons Science and Technology Committee, *Digital Skills Crisis*.
197 Department for Digital, Culture, Media & Sport, *UK Digital Strategy 2017.*
198 Rosemary Luckin, *Enhancing Learning and Teaching with Technology. What the Research Says*.

Conclusion

EdTech presents a great opportunity to help level the playing field and create more equal opportunities for every child. Technology can enhance learning and teaching, whilst also equipping pupils with the skills and resources to thrive in the future workforce.[199] With a stubborn gap in the opportunities offered to children from different backgrounds,[200] innovation should be welcomed.

EdTech is increasingly supported by a sound evidence base.[201] Research has recognised that different technologies produce varying outcomes, and therefore effective implementation is crucial.[202] Technology is only a tool, not an end in itself. This is particularly true when using digital tools to help narrowing the opportunity gap. As technology is becoming ubiquitous across households, the education system must enable children from all backgrounds to use it to its full advantage. By focusing on the design of technology to enhance learning and improve outcomes, the potential of EdTech can be realised.

Translating evidence into practice involves various actors in the education sector to work together. An EEF study published last year found that providing schools with evidence and nothing else led to no improvement in pupils' performance.[203] Embedding good quality EdTech into the system requires a blend of autonomy, guidance and incentives to create a tech-enabled education system that helps narrow the opportunity gap and works for everyone.

199 Ibid.
200 Social Mobility Commission, *State of the Nation 2017: Social Mobility in Great Britain*.
201 Rosemary Luckin, *Enhancing Learning and Teaching with Technology. What the Research Says*.
202 Ibid.
203 The Economist, 'England Has Become One of the World's Biggest Education Laboratories'.

Technical appendix

To create estimates of how the pupil premium is spent in Section 4.1, a sample of pupil premium statements were investigated.

The sample

40 schools from across England were selected for this analysis to investigate how the pupil premium was being spent. While such a sample cannot comprehensively represent spend across the UK, the sample was stratified to help reflect diversity.

20 primary schools and 20 secondary schools were selected from the top and bottom deciles of pupil premium eligibility and were geographically well spread. (see Figures A1 and A2).

Figure A1: Primary school sample map

Note: Blue indicates schools in the bottom decile of pupil premium eligibility, red indicates top decile.

Figure A2: Secondary school sample map

Note: Blue indicates schools in the bottom decile of pupil premium eligibility, red indicates top decile.

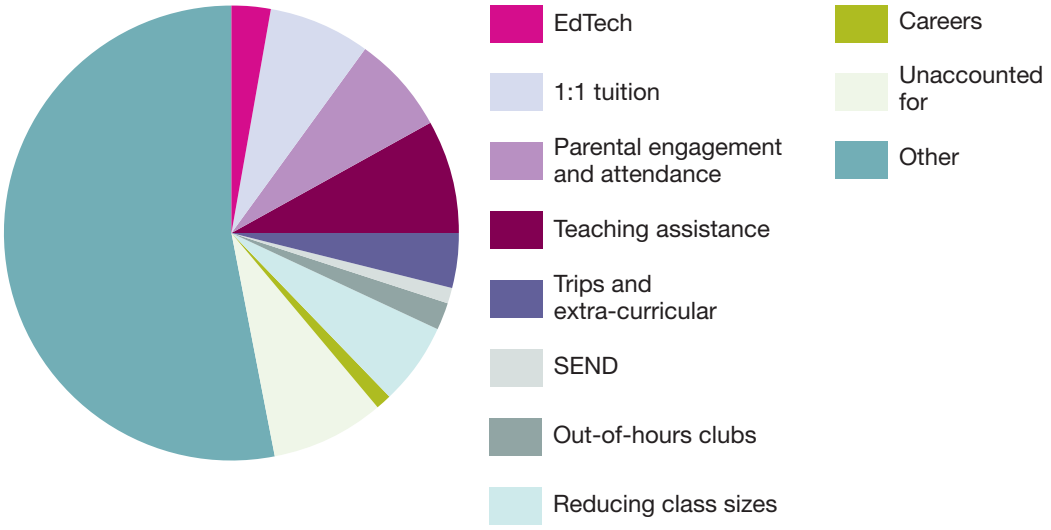
Methodology

To assess how pupil premium funding is being allocated, the pupil premium statements of each of these schools were carefully analysed. The scope of each category is determined by the practical steps schools take to produce the desired outcome. For example, 'parental engagement' include schemes school define to improve pupil attendance, which inevitably involve engaging parents, even if not specified in the pupil premium statement. The following categories were devised after such a hermeneutic textual analysis of schools' statements:

- EdTech
- Parental engagement and attendance
- 1:1 tuition
- Teaching assistants
- Trips and extra-curricular
- SEND
- Out-of-hours clubs
- Reducing class sizes
- Careers
- Unaccounted for
- Other

An absolute spend on each of these categories was recorded in a breakdown of each school's overall pupil premium spend. The overall breakdown of how the pupil premium was being used, by category, was expressed in a pie chart to demonstrate just how varied schools' use of the funding is. This is shown in Figure A3.

Figure A3: Sample pupil premium spend



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