ECONOMIST IMPACT

Getting personal:

The future of education post Covid-19

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Contents

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- Jim Burton, chief executive officer, Cascaid
- Abdul Chohan, vice-president of learning, Showbie
- Priya Lakhani, chief executive officer, CENTURY Tech
- Phyllis Lockett, chief executive officer, LEAP Innovations
- Sheila MacNeill, chair, Association of Learning Technology
- Dr Louis Major, senior research associate, Cambridge University
- Dr John F Pane, senior scientist, RAND Corporation
- Richard Parker, head, International School of London
- Michael J Petrilli, president, Thomas B Fordham Institute
- James Rickabaugh, senior advisor, Institute for Personalised Learning
- Amy Solder, head of partnership programmes, Nesta
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The report was produced by a team of Economist Impact researchers, writers, editors and graphic designers, including:

- Jonathan Birdwell – Project director
- Antonia Kerle – Project leader
- Isabella Crispino – Research analyst
- Christine Bubar – Primary research co-lead
- Tom Nolan – Primary research co-lead
- Paul Kielstra – Contributing author
- Susana Ferraz – Designer
- Jan Copeman – Copy editor

For any enquiries about the report, please contact:

Antonia Kerle
Economist Impact London | United Kingdom
E: antoniakerle@economist.com
Tel: + 44 (0)20 7576 8268

Foreword

Dear colleagues,

Since 1996, when we welcomed our first students to Qatar Academy Doha—our first school—Qatar Foundation has sought to lead learning in our country and our region. The quarter-century since those first students stepped through our doors has seen many things change, but one thing has remained the same: our approach to education recognising that each child is unique.

Instead of forcing students into a one-size-fits-all approach to teaching and learning, we nurture the development of the whole child, because we believe this is how a passion for lifelong learning takes hold. When we consider the challenges and opportunities that we will all face over the coming decades, fostering a culture of lifelong learning will help our children be more resilient and better prepared to face those challenges, take those opportunities, and play an active role in shaping our societies.

The Covid-19 pandemic, and the abrupt dislocation of learning that it caused, forced education systems around the world to move rapidly online to provide some level of continuity. This enabled education technology providers to gather huge amounts of data on how students and teachers use these platforms. And the experience has made it almost inevitable that technology-assisted learning will play an increasingly important role in learning within the classroom, and beyond.

Our challenge is to ensure that the way we teach and learn is not defined by this technology. Instead, education technology should support pedagogy and enable the opening of multiple pathways for each student.

It is because we must recognise both educational and technological challenges that we commissioned Economist Impact to develop this report on Personalising Learning. We hope its findings will make a real contribution to the urgent global conversation we need to have on how to create spaces where each child's talent is nurtured.

In a turbulent world, what lies before us can feel daunting. Ensuring that every person can walk towards the future with confidence is at the core of what Qatar Foundation strives for. And we know that so many others around the world share this commitment.

We hope you find this report valuable, and we look forward to continuing this conversation together.

Sincerely,

Abeer Al-Khalifa

President
Pre-University Education
Qatar Foundation

Executive summary

Rapid change in how societies deliver education is unusual, but we live in unusual times. Schools on both sides of the Atlantic underwent unprecedented upheaval during Covid-19, which sparked wider questions about what teaching should look like. There was rapid expansion in home-schooling and increased political tension over curricula, but perhaps most significant of all—although less headline-grabbing—was the renewed interest in personalised learning. Personalised learning long predates the pandemic, but Covid-19 stimulated fresh enthusiasm about its potential to transform education.

However, personalised learning is more of a general idea or philosophy than a clear blueprint: there is no exact definition or agreed-upon programme. The role of technology is highly debated, measuring effectiveness is tricky, and advocates claim some of its benefits aren't reflected in how we measure student outcomes. It's a popular and exciting approach to teaching: but one with several outstanding questions and uncertainties.

Economist Impact, sponsored by Qatar Foundation, set out to understand how Covid-19 has impacted attitudes towards personalised learning in the UK and US. The study draws on two new surveys. The first surveyed 300 principals and vice principals ('educators') at primary and secondary schools. The second surveyed 150 senior executives who work at educational technology ('ed-tech') firms. We also conducted in-depth interviews with 12 carefully selected experts.

We find that Covid-19 has created an unprecedented occasion to re-think education. Already, schools are being forced to experiment with methods and techniques that in many ways align with personalised learning. Educators are overwhelmingly positive about its potential value, and investment and implementation is set to increase. However, to ensure it can reach its full potential, there needs to be further work to develop new forms of performance metrics, enhance collaboration between classrooms and ed-tech firms, and secure buy-in from students and parents.

THE KEY FINDINGS ARE:

Covid-19 accelerated adoption of personalised learning

Among educators surveyed by Economist Impact, 99% agree that Covid-19 "accelerated my school's adoption of personalised learning", and that it has made this approach to education "more relevant than ever". The pandemic forced schools to adopt various forms of student-led and internet-based remote learning, both of which are key elements in personalised approaches. While it's not clear whether these changes amounted to a personalised pedagogy, they at least demonstrated technology's ability to facilitate substantial change.

There is near universal enthusiasm for the idea of 'personalised learning' but no clarity over what this means in practice

All educators surveyed (100%) say that teachers support the idea of personalised learning, and

99% say that school administrators support it. Over nine-in-ten report that this style of education is a priority at their institutions and that budgets for it will increase in the coming years. However, no common definition exists, which can cause some confusion. Our survey figures therefore may reflect a general openness to new approaches rather than a consensus on what exactly those approaches should be.

Educators agree that personalised learning is well suited for imparting 21st century skills

Personalised learning seems particularly effective in building what some educators call '21st century skills'. Around half, or more, of surveyed educators consider to think it helps develop problem solving skills (70%), critical thinking (69%), creativity (53%), confidence (51%), and communication skills (50%). However, existing systems of measurement and evaluation do not always reflect the advantages of personalised learning.

The personalised learning spectrum stretches from 'teacher-led' approaches to more radical 'student-led' methods

Personalised learning is best seen as a spectrum of approaches. On one end is the more 'traditional' teacher-led approach, where teachers still craft lessons in ways that are more likely to meet student needs. At the other, there is greater student agency and classes are more learner-led: instead of providing the necessary information for students to internalise, the teacher becomes a mentor to help them find out for themselves. (There are of course overlaps as well as differences between these two approaches).

Educators tend to favour the 'teacher-led' approach

Most respondents are currently pursuing moderate innovation to traditional pedagogy: at 73% of institutions surveyed, personalised-learning-related changes include use of learning plans tailored to student needs. Only 26% of those surveyed say that instruction is paced according to the needs of individual students and just 14% say that learners have a say in what, when, and where they learn.

The technology being used primarily supports teacher-led personalised learning

Information technology is a vital tool for delivering personalised learning, and the specific software used matters. The schools of nearly all respondents (92%) have adopted 'Learning Management Systems' to buttress personalised learning. These e-learning tools often assist student-teacher interaction, but their strength is in making it easier for teachers to do what they do already. Technology that is more consistent with a learner-led approach are less frequently adopted: the schools of 46% of respondents have invested in Exploratory Learning Environments; 32% in Game-based Learning Tools; 24% in Dialogue-based Tutoring; and 8% in Virtual Agents.

Although technology is a key tool for delivery, it is not enough on its own

Already, 70% of schools use digital tools to deliver what they define as personalised learning, and 93% expect they will either increase or start doing so in the next two years. And yet, 98% of surveyed educators warned that—especially after the pandemic—the current discussion is too focused on the technology itself. Too often, technology and personalised learning are conflated: according to survey respondents, delivering personalised education at scale requires technology, but it is most valuable where it provides teachers with insights about their students and enhances interaction between the two. Technology adoption does not change culture or teaching approach: instead the culture changes the type of technology adopted.

Greater cooperation between ed-tech firms and schools is needed to develop more effective products

Over 90% of educators and senior execs from ed-tech firms (companies that specialise in creating technology for the classroom) agree that "increased collaboration between schools and ed-tech providers is necessary to develop effective digital tools". Meanwhile, 82% of ed-tech executives believe that "lack of access to research and development in schools is a barrier to innovation for my industry". Greater collaboration will benefit both parties, and help ed-tech companies design products tailored to teachers' needs.

Students and parents are less convinced than teachers of the benefits of personalised learning

Among surveyed educators, 87% think that teachers are 'very supportive' of introducing personalised learning into the classroom. But only 26% say the same of parents and just 8% the same of students (although a majority say both parents and students are 'somewhat supportive'). This was mirrored in our expert interviews: personalised learning represents a major change from what students are used to, and the way parents themselves were taught in school. Any successful personalised learning programme must convince these groups of its value. According to our expert interviews, experience of personalised learning is the most effective way to do that.

Introduction: Personalisation in the digital age

There is no formal definition or blueprint for personalised learning: it is more a general philosophy of pedagogy than a set of precise instructions. Advanced HE—a professional education body in the UK—defines it as *"a range of learning experiences and teaching strategies that aim to address the differing learning needs, interests and diverse backgrounds of learners"*. Similarly 'LEAP'—a US network of personalised learning specialists—has three guiding principles: emphasise what learners bring to education rather than what they need from it: that each one succeed with individually customised support; that every student brings strengths; and that learner agency is essential. Personalised learning often involves creating a 'learning plan' for each student that includes flexibility in both subject matter and speed of instruction.[1]

Personalised learning is not a new idea. Some trace its origins to a well-known 1984 research paper by academic Benjamin Bloom, who found

[1] https://www.studyinternational.com/news/personalised-learning/

students that received 'personalised instructions' outperformed their peers.[2] However, many teachers would understandably say they've always 'personalised' their lessons to each student as much as possible. By the mid-2000s, it was described as the 'big idea' for school education in the UK and was a key part of the Department for Education's five-year strategy in 2004.[3] However, over the last decade the idea has become increasingly prominent, with particular focus on the role technology can play.[4] Covid-19 appears to have piqued further interest in the subject. The pandemic—and associated school closures—forced educators to seriously consider how remote and technology-enabled learning can best deliver for students.[5] Now, personalised learning seems on the cusp of challenging traditional models of primary and secondary education. Priya Lakhani—founder and CEO of Century, an education technology ('ed-tech') company—explains that, while still a niche approach, "it is not the future, but the now, of education". She estimates that over a million students benefit from some kind of personalised learning using her company's technology alone.

And yet there remain several outstanding questions. "We are in the early days of this sort of service; currently version 1.0 territory", reckons Jim Burton, CEO of Cascaid, which provides online career programmes.[6] Technology is agreed to be vital, as it allows for more personalised performance metrics and can create unique and bespoke tasks and 'pathways' for each student at a scale and speed teachers would struggle to match. But there are many different technologies available, and some analysts have noted that educators can become too focused on the technology itself. More fundamentally, the absence of a clear definition presents several challenges. 'Personalised learning' is one of those phrases that is hard to disagree with. "Who would say, "I'm not for personalising learning"?" wonders James Rickabaugh, from the Institute for Personalised Learning. "Who would say, "I don't want kids to have a personal experience"?" As John F Pane, a senior scientist specialising in educational innovation at the RAND Corporation, puts it, "there is enthusiasm out there. Most principals say they intend to implement personalised learning. But what *is* this in practice?" Even within the same school implementing the idea, he notes, a common vision may be lacking. Definitional uncertainty also makes measuring effectiveness extremely difficult. And while there are certainly many schools that appear to be embracing this new approach, others are struggling with the rapid introduction of home and remote working.[7]

METHODOLOGY

Personalised learning is still a relatively young approach, with many outstanding questions.

To better gauge how it is being picked up and implemented—and with what associated challenges—Economist Impact fielded two surveys to educators and ed-tech executives in the UK and US [see Appendix for survey details]:

- **Educators:** A survey of 300 principals and vice principals at primary and secondary schools.
- **Ed-tech executives:** A survey of 150 manager level and above employees at ed-tech firms.

Survey findings were supplemented with twelve one-on-one expert interviews. The findings at the core of this programme provide unique insight into attitudes towards personalised learning in the wake of Covid-19 as well as what would be required to realise its full potential.

[2] http://web.mit.edu/5.95/readings/bloom-two-sigma.pdf
[3] http://reflectiveteaching.co.uk/media/10_Personalised_Learning_TLRP_Commentary.pdf
[4] https://edtechnology.co.uk/latest-news/rise-personalised-learning-education/
[5] https://all4ed.org/blog/personalized-learning-in-a-post-covid-19-world/
[6] https://edtechnology.co.uk/latest-news/rise-personalised-learning-education/
[7] https://all4ed.org/blog/personalized-learning-in-a-post-covid-19-world/

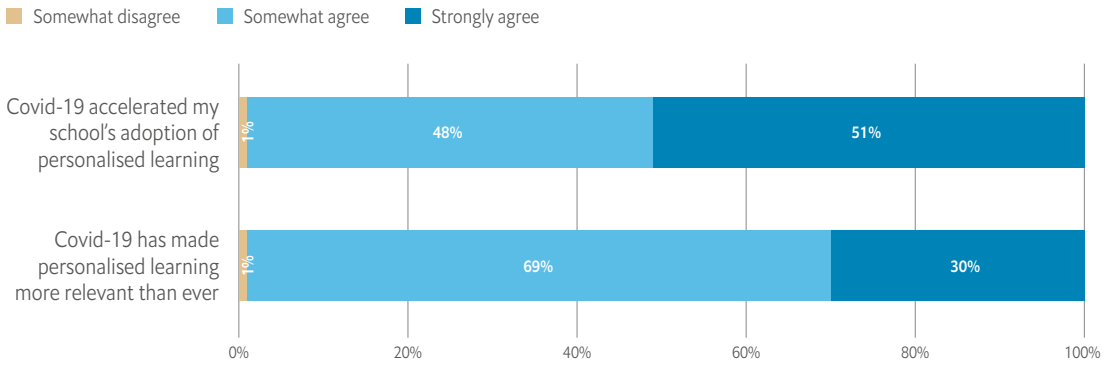
Key findings: Personalised learning post covid-19

Covid-19 accelerated adoption of personalised learning.

The effect of Covid-19-related lockdowns on personalised learning has been hugely significant, bringing remote and internet-based lessons to the forefront of teaching decisions. Of surveyed educators, 99% agreed that Covid-19 "accelerated my school's adoption of personalised learning, with the same percentage agreeing that Covid-19 has made the personalised-learning approach to education "more relevant than ever".

The first wave

To what extent do you agree or disagree with the following statements?



Source: Economist Impact Survey, Educators

Conceptual uncertainty

Despite these results, and in the absence of a common definition of personalised learning, it is not certain what adoption actually looks like: and working remotely via the internet does not necessarily make teaching 'personalised'. As Kristen Watkins, director of Personalised Learning at the Dallas Independent School District explains, "just because you were teaching on a device or students were learning online, does not necessarily mean it was personalised. That is a big misconception."

Nevertheless, forced reliance on remote learning did reveal the scope for more meaningful change. Kristen Watkins suggests that the last two years have forced people to "redefine what teaching and learning look like". This is especially true in terms of technology and e-learning adoption. According

to Dr Louis Major, Senior Research Associate at Cambridge University, many educators realised that "what was previously considered useful, but not practically possible at scale", could actually work.

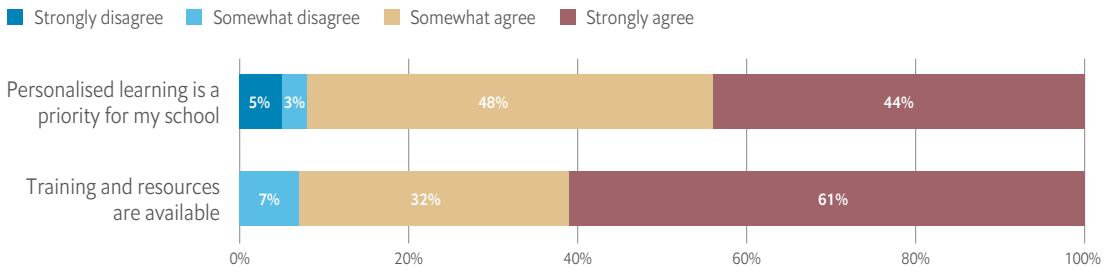
Less immediately visible, but perhaps even more significant in the longer-term, was the shift in relations between teachers and students. One of the principles of personalised learning is that it is learner-driven. According to Abdul Chohan, vice-president of learning at ed-tech company, Showbie, schooling was forced to become learner-driven because the students were alone and dependent on their ability to access simple and reliable technology. According to other experts, anecdotal evidence suggests that students used to exercising substantial agency were able to do better academically during this period. However, the shift in teacher-student relations might have another consequence. As schools initiated remote learning, traditional tools of coercion no longer applied. According to James Rickabaugh, senior advisor at the Institute of Personalised Learning, many teachers wondered how they could engage students without force—and the experience might outlast the pandemic, as students are now used to the extra freedom. "Some are pushing back… I was able to manage my [own] time and engage".

Support for personalised learning among educators

Personalised learning remains a relatively new approach to pedagogy. We asked respondents to what degree it was a priority in their schools—and whether they were well equipped to deliver it. 92% of survey respondents report that providing students with a personalised learning experience is a priority in their schools, while 93% say that teachers in their schools have the training and resources needed to do it.

High priority

To what extent do you agree or disagree with the following statements?



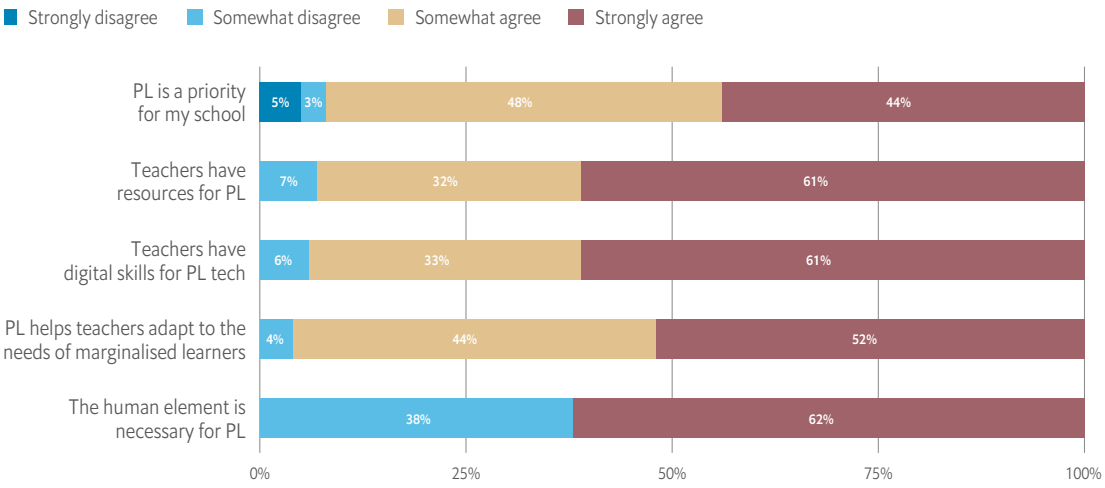
Source: Economist Impact Survey, Educators

Looking to the future, 91% believe that their school's budget for personalised learning will increase in the coming five years. 77% think that within five years most schools in their countries will have personalised learning programmes in place. 87% report that teachers at their schools are generally 'very supportive' of the introduction of personalised learning into classrooms, with the remainder saying they are 'somewhat supportive'.

For several decades, educationalists have been discussing the need to integrate the so-called "21st century skills" necessary for success in the modern world—such as problem solving, creativity, critical thinking, collaboration, self-direction, and social skills—into the school system. Personalised learning seems particularly effective in building these skills. Around half or more of surveyed educators consider it helps develop problem-solving skills (70%), critical thinking (69%), creativity (53%), confidence (51%), and communication skills (50%).

The five-year plan

In the next five years, how likely are the following scenarios?



Source: Economist Impact Survey, Educators

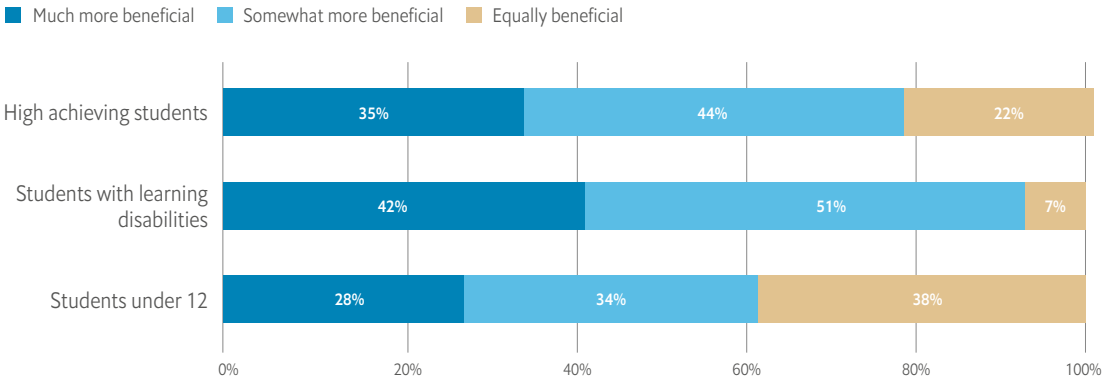
An idea that works

Clearly there is both significant support for, and investment in, the idea of personalised learning. One reason for this enthusiasm is confidence in the idea of personalisation itself: 90% of those surveyed think personalised learning offers a better quality of education compared to traditional classroom learning.

Interestingly, educators believe it is especially appropriate for the children they teach. Among respondents from primary schools, 99% believe that it is 'equally' or 'more' beneficial for students aged under 12 years than it is for older students; while 89% of secondary school teachers say it is 'equally' or 'more' beneficial for their cohort than for younger learners.

Who benefits?

Which group of students most benefit from PL?



Source: Economist Impact Survey, Educators

Personalised learning more likely to be 'teacher-led' than 'student-led'

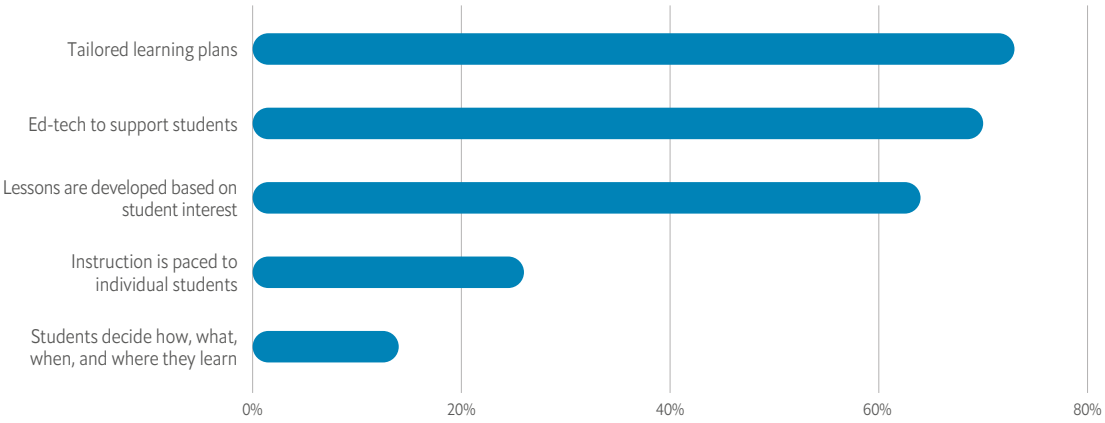
Personalised education is not conducive to the existence of hard and simple categories. It is helpful to imagine it as a spectrum of approaches. At one end is the more 'traditional' teacher-led approach, where teachers still craft lessons in ways that are more likely to meet student needs. At the other, there is greater student agency and classes are more learner-led: instead of providing the necessary information for students to internalise, the teacher becomes a mentor to help them find out for themselves. As Abdul Chohan explains, educational institutions that are trying to adopt personalisation tend to fall somewhere on this spectrum, and there is a lot of middle ground.[8]

To better understand the type of personalised learning teachers were implementing, we asked a series of questions about specific applications and the balance between student-led and teacher-led approaches.

73% reported that the shift toward personalised learning at their institution includes the use of learning plans more tailored to student needs, while 64% reported the development of lessons based on the interests of students. Such changes are consistent with usual forms of class-wide teaching, even if the practice is better targeted to hold student attention. (see Appendix 2)

Practice makes perfect

Which of the following teaching practices does your school employ to incorporate PL into the classroom?



Source: Economist Impact Survey, Educators

However, only 26% of those surveyed say that, in their schools, instruction is paced according to the needs of individual students. Just 14% report that learners are given a say in what, when, and where they learn. There was little difference between responses from primary and secondary school educators. More mature students, therefore, do not appear to benefit from any greater individualisation.

Doing the same, only better

These results suggest that in most respondents' schools, classroom innovations under the rubric of personalised learning are largely improvements to traditional teaching methods. By contrast, tuition shaped around the individual is rarer.

According to our expert interviews, this is a major divergence. Richard Parker, Head of the International School of London, labels teacher-driven education that takes more account of the student as 'differentiation' rather than 'personalised learning', which he reserves for learner-driven

[8] For what this looks like in practice in one geographic area, see Larry Cuban, "Second Draft: A Continuum of Personalized Learning", 27 September 2018, blog entry in *Larry Cuban on School Reform and Classroom Practice*, https://larrycuban.wordpress.com/2018/09/27/ second-draft-a-continuum-of-personalized-learning/

approaches. While the majority of experts interviewed see some form of learner-driven pedagogy as a desirable end goal, others prefer the less disruptive approach. Mike Petrilli, president of the Thomas B Fordham Institute, a US education think tank, sees benefit in personalisation "to the degree that we can help educators figure out how to target instruction that helps kids learn as much as they can", but is more sceptical of any wider agenda related to the idea. For a variety of reasons, schools can be fairly conservative (and those in the teaching profession are statistically much more likely to be risk-averse than the general population).[9] Nor do parents embrace novelty for its own sake, says Richard Parker, because "nobody wants to have a school experiment on their child". Finding ways to demonstrate which elements of personalised learning may improve outcomes could address these concerns, but raises its own issues, discussed later.

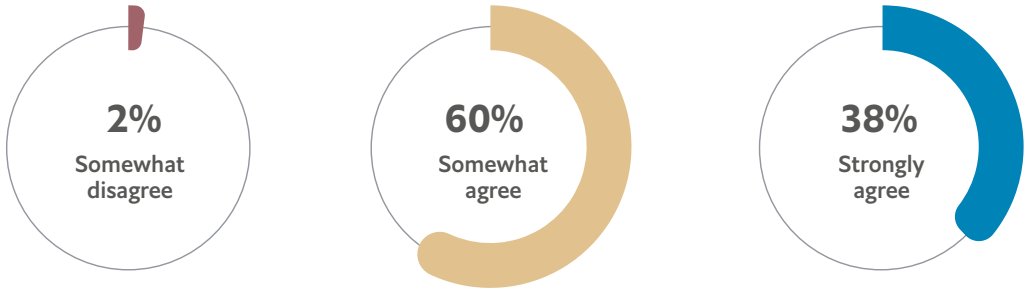
Technology plays a key role but is not enough on its own

Technology plays a critical role in personalised-learning delivery. Phyllis Lockett, CEO of LEAP Innovations, believes that it would be difficult "to fully scale personalised learning without technology".

We asked how educators were using technology to implement personalised learning: 70% of surveyed educators say that their schools use digital tools to deliver personalised learning and 90% expect an increase in the application of technology for this purpose. However, this results in nearly universal wariness: 98% of surveyed educators believe that "the quick shift to remote learning during the pandemic has made us too focused on the technology side of personalised learning". Similarly, among the risks which they associate with this kind of approach, 46% list students becoming over-reliant on technology—the second most common answer.

Tech-crazed?

To what extent do you agree with the following statement:
Remote learning during Covid-19 has made us too focused on technology



Source: Economist Impact Survey, Educators

The distraction of technology

According to Phyllis Lockett, technology is a useful tool for what is "first and foremost a pedagogical shift. Technology becomes a hindrance where people think that personalised learning is setting kids up on technology for technology's sake; that the platform replaces the teacher." Kristen Watkins has often run into the "misconception that kids are sitting on their devices 100% of the time. This is not the case." Other of our expert interviews stress that technology's biggest impact on personalised learning comes when it allows humans and students to connect in a human way.

[9] Richard Harris, "Risk aversion in a performativity culture – what can we learn from teachers' curriculum decision making in history?" *Journal of Curriculum Studies*, 2021, https://www.tandfonline.com/doi/full/10.1080/00220272.2021.1884294; Adam Ayaita and Kathleen Stürmer, "Risk aversion and the teaching profession: An analysis including different forms of risk aversion, different control groups, selection and socialization effects, *SOEP papers on Multidisciplinary Panel Data Research, No. 1057*, 2019, https://www.econstor.eu/bitstream/10419/206643/1/168114199X.pdf.

Indeed, were personalised learning predominantly a technological innovation, its popularity and potential impact would likely be far lower. Sheila MacNeill, an education consultant specialising in both ed-tech and personalised learning, says that "technology on its own can't disrupt education. [Educators, administrators, parents, and students] are quite conservative. To change pedagogy requires a shift in mindset across society." Substantial research backs up this view. Justin Rye's extensive 2020 study *Failure to Disrupt: Why Technology Alone Can't Transform Education* found repeatedly that apparently promising new technology tools were no match for embedded institutional practices.

The often unhappy history of technology-related educational innovation creates a challenging context for the adoption of tools to support personalised learning. A legacy of undelivered technology promise leads to wariness, if not suspicion, among educators. "There has always been a lot of hype around ed-tech", explains Amy Solder, an education specialist with Nesta. Only in the last few years have organisations come to grips with the need for evidence of outcomes. Similarly, says James Rickabaugh, "technology has over-promised in the past. So people get nervous and are sceptical."

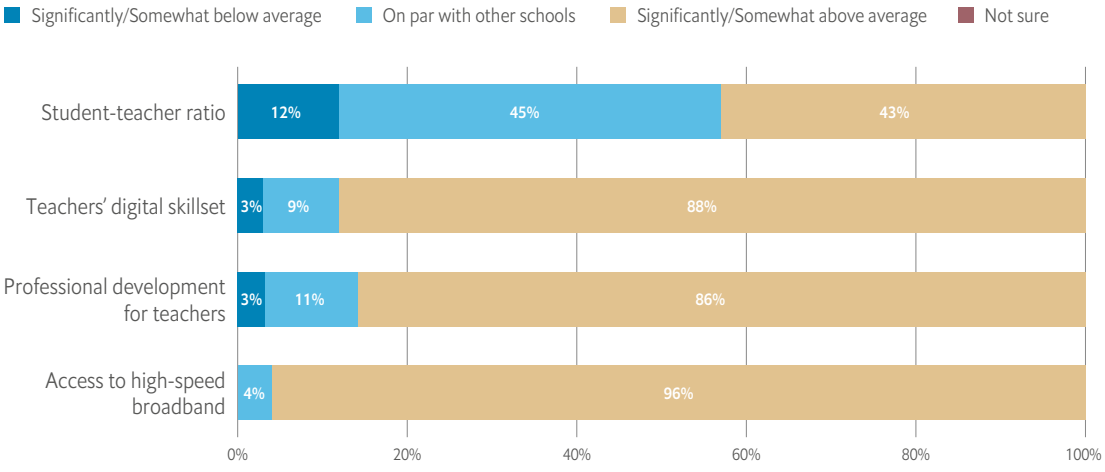
How 'tech-ready' are schools?

One of the challenges noted by our expert interviews was how to turn technology investment into demonstrably improved student outcomes. We asked our survey respondents a series of questions about their current technology arrangements and student scores.

96% of respondents say their schools have above average high-speed broadband, and 68% describe it as "significantly better" than the mean. 86% report that their institutions have above average ed-tech and digital resources, including 47% who rate it "significantly above the norm".

Ahead of the curve

Compared to other schools in your district, how would you rate your school in the following areas?



Source: Economist Impact Survey, Educators

When asked about educational outcomes, however, 66% of those surveyed say that their school's students achieve only average scores on standardised tests. Most of the rest (29% of all respondents) report above average results, but they are significantly better for only 2%.

Ed-tech: more than just 'tech'

This apparent failure to turn technology assets into better student results is difficult to interpret in our survey. The effect of any ed-tech investment depends on what specifically is being bought, its application (both intended and real), how well teachers and students are trained in its use, and which outcomes are measured.

These broad results nevertheless illustrate that effective use of ed-tech requires far more than putting in place the latest tools.[10] The failure to get more out of technology has any number of causes, and perhaps the technology itself simply did not deliver as promised. Educators might sometimes be part of the problem too. Sheila MacNeill observes that, during the pandemic, a widespread lack of teacher training and integration of technology into curricula came to light. "Schools are tech-rich spaces, but we still had to scramble moving things online", she notes. According to Abdul Chohan, "education has been good at doing the wrong things really well. We invest in technology that doesn't work... technology is just a thing. What really drives something being brilliant or not usable is the teachers and students ability to use it as an amplifier for learning."

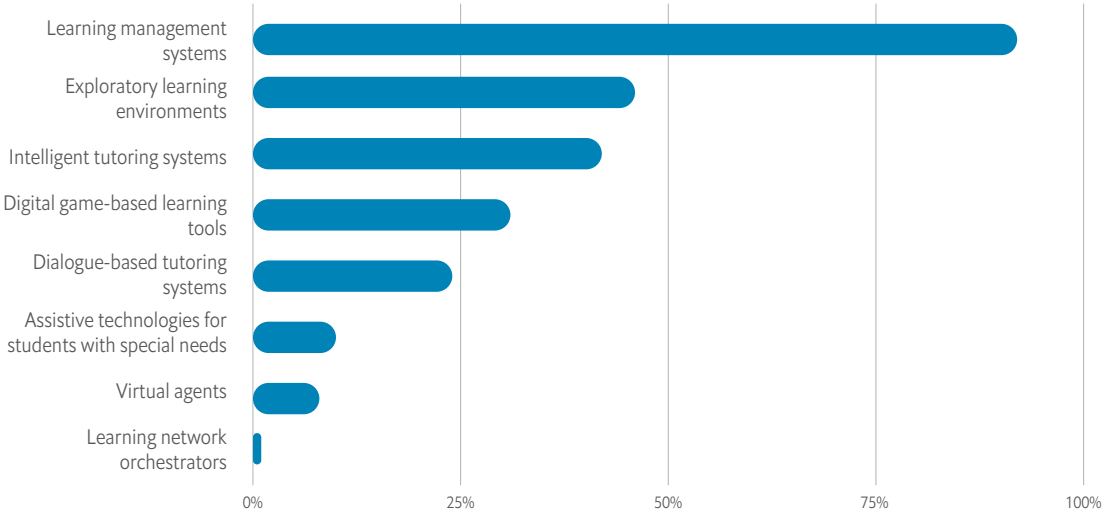
Technology tools used by educators reflect the 'teacher-led' approach

Technology acts as an enabler for greater personalisation in schools. But whether or not it is implemented effectively depends on the attitudes and behaviours of educators, and the technologies they choose to deliver it. As described above, 70% of respondents report greater use of digital tools to support personalised learning—but the specific type matters. To better understand their broader approach to personalisation, we asked what sorts of technologies and tools educators were using.

92% of respondents said they'd introduced 'Learning Management Systems' (and it was the only answer cited by over half of those surveyed). Such systems are largely supportive of current pedagogy. More disruptive technologies were mentioned far less often. For example, only 46% of those surveyed report investment in Exploratory Learning Environments, 32% in Game-based

Education, innovation

Which of the following ed-tech does your school currently employ?



Source: Economist Impact Survey, Educators

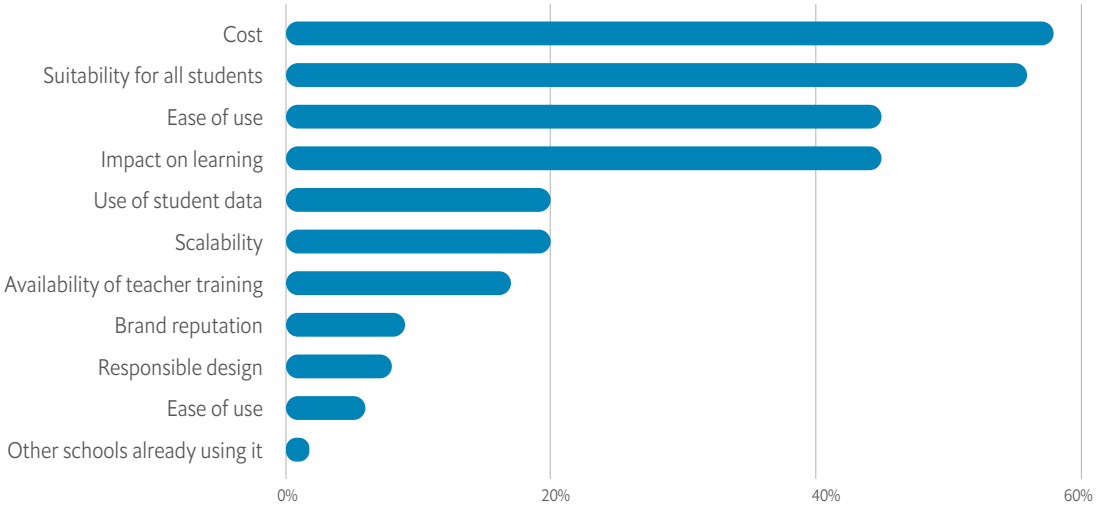
[10] For a more detailed discussion of the complex ways in which technology does, and does not, have an effect on student grades, see the McKinsey and Company report: Jake Bryant et al, "New global data reveal education technology's impact on learning", 2020, https://www.mckinsey.com/~/media/McKinsey/Industries/Social%20Sector/Our%20Insights/New%20global%20data%20reveal%20education%20technologys%20impact%20on%20learning/New-global-data-reveal-education-technologys-impact-on-learning.pdf.

Learning Tools, 24% in Dialogue-based Tutoring, and 8% in Virtual Agents.

The way technology is purchased works against too rapid change. According to our survey, cost is the biggest issue when it comes to choosing technology (cited by 58%), more often a factor even than the effect on student outcomes (45%).

Decisions, decisions

What are the most important decision-making criteria when your school is evaluating a new education technology to adopt?



Source: Economist Impact Survey, Educators

First we shape our tools

Our survey indicates that, to a large degree, schools are deploying technology designed to improve, but not fundamentally alter, the educational status quo. And this tendency towards limited innovation is unlikely to change soon. As James Rickabaugh observes, "technology developers have to sell a product into a market that is saying, 'I want ... tools to do what I'm doing better, faster, and easier'". They therefore—understandably—tend to focus on providing exactly that.

The lower figures for the technologies other than Learning Management Systems may grow soon: respondents at more schools foresee the purchase of each of them in the next two years. But even if all these projected investments actually take place, adoption will be far from universal. Game-based Learning Tools, Dialogue-based Tutoring, and Virtual Agents will be present in only around half of schools. It is hard to avoid the conclusion that personalised learning ed-tech is, in James Rickabaugh's words, "helping educators to extend the learning experience, not to change it or to design experiences that are fundamentally different".

The significance of cost is also unsurprising. According to our expert interviews, budget constraints inevitably affect educational decisions, and it is difficult to know what effect any new technology purchase might have. Within such constraints, administrators are more likely to spend on technology that helps schools do what they are doing rather than make potentially large up-front investments typical of a major change in practice. This dynamic suggests—perhaps ironically—that the kind of technology being adopted and the way decisions about it are made do more to entrench the status quo than disrupt it.

That said, teacher-led ed-tech can enhance personalised education in important ways. Learning Management Systems can greatly increase the speed and efficiency with which teachers perform

routine, 'low-value' tasks, such as reproducing handouts, which can lower costs and free up more time for individual teaching and improved communication. And even that can create positive disruption to existing patterns.

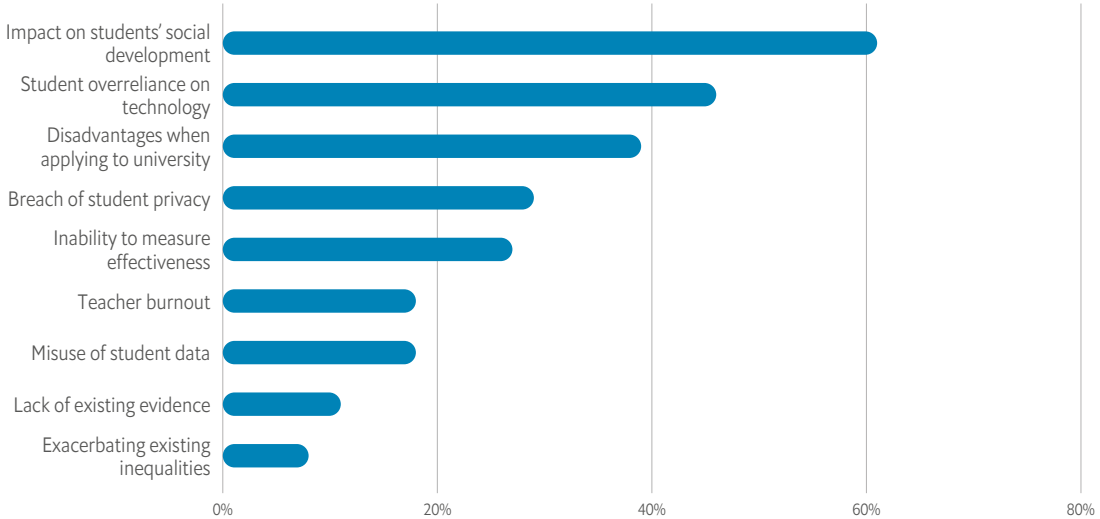
Some of our expert interviewees also see further opportunities for teacher-led technology to facilitate greater personalisation. John Pane of RAND, for example, believes that the key technological opportunity is to "help orchestrate and learning", which he thinks "may be much more important than its direct role in providing instruction". Equally, student-led technology can also provide many wider benefits. According to Kristen Watkins, new ed-tech can help "make sure that [educators] can analyse student data so that they know where every child is starting, and then select the best blended-learning model to personalise for the individual".

There is broad consensus among our expert interviews that technology has a potential role in supporting the transformation of education to more learner-led personalised learning. James Rickabaugh sees the "big promise" as encouraging educators to think about learners "as creators—giving them an opportunity to create something new". And a good amount of ed-tech software is trying to do exactly that, states Abdul Chohan of Showbie, allowing students to "express what and how they have learnt in a format that allows for freedom of expression, such as making a movie or creating a multimedia project. This kind of flexibility, and the ability of the teacher to respond with precise, rich, feedback on next steps, in an efficient way, is only available through technology." Where personalised learning seeks such output (for example, the Leap Framework's emphasis on learner demonstration of subject mastery) this kind of ed-tech will prove valuable. Where traditional testing is much preferred, it will likely be little used. As Sheila MacNeill explains, in personalised education, the change in culture and mindset shapes decisions on ed-tech, not the other way around.

Barriers and opportunities for personalised learning

Ed-tech, like most technology, is neither perfect for current needs nor future-proof. We asked survey respondents about barriers and opportunities to further improve ed-tech products. The risk of personalised learning most commonly cited by educators is the potential impact on students' social development (62%). This is followed by over-reliance on technology (46%) and disadvantages from

The risks of getting personal
What are the biggest risks with PL?

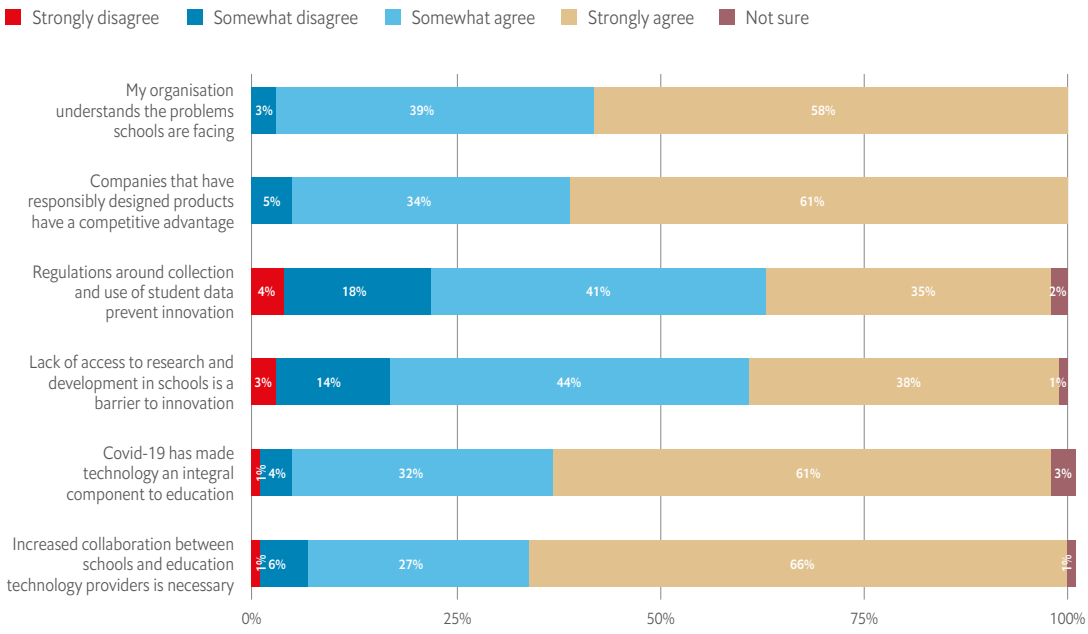


Source: Economist Impact Survey, Educators

not following the traditional systems of evaluation (38%). Issues related to student privacy and misuse of student data, while mentioned, were far less common (30% and 18% respectively). Over half (52%) of educators think that cost is the biggest barrier to incorporating ed-tech, followed by collection and use of student data (27%).

Tech-evaluation

To what extent do you agree or disagree with the following statements?



Source: Economist Impact Survey, Ed Tech

Ed-tech executives have slightly different concerns. 76% of ed-tech executives report that strict student data regulations currently prevent innovation. However, 94% of these respondents believe that firms that can "show the responsible design and development of their products will have a competitive advantage".

Collaboration is king

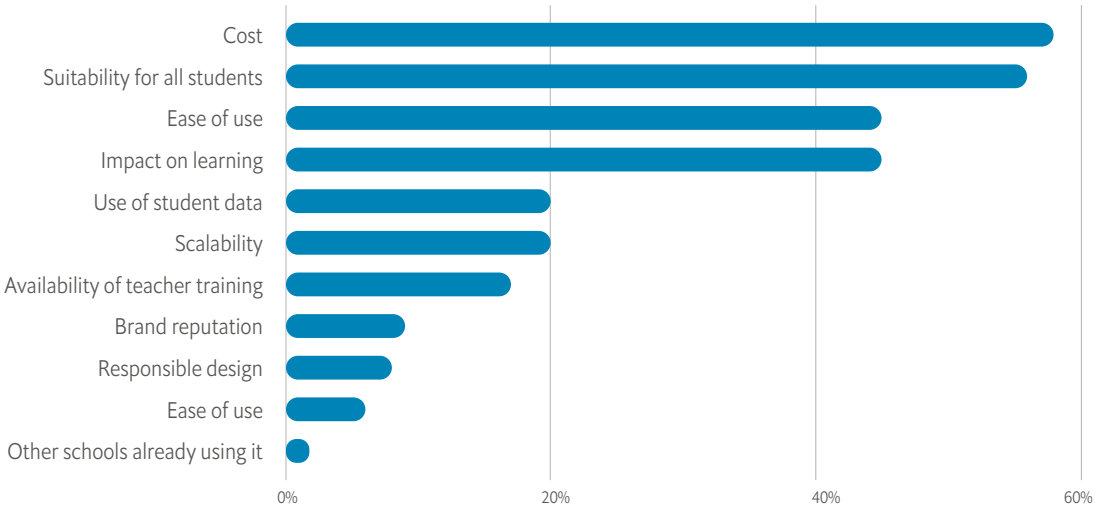
In terms of overcoming some of these barriers, both groups recognise the value of collaboration. 98% of educators and 93% of ed-tech executives agree that "increased collaboration between schools and ed-tech providers is necessary to develop effective digital tools". Similarly, 82% of ed-tech executives believe that "lack of access to research and development in schools is a barrier to innovation for my industry". 60% of ed-tech companies describe teacher feedback on their products as "critical for development".

Among our expert interviews, privacy was a recurring theme—often cited as a concern, including for the companies providing the technology. "These are absolutely huge issues", believes Sheila MacNeill, "and are getting higher and higher on people's agendas". If anything, she adds, concerns have accelerated after the shift of so much of life online during the pandemic.

And yet these issues do not appear to be reflected to the same extent by educators. According to Sheila MacNeill, "schools are trusted places. We send our kids there. We are creating more data. There is the presumption that when you use it in school, it is safe." Educators, however, may not

Technology adoption

What are the most important decision-making criteria when s school is evaluating a new education technology to potentially adopt?



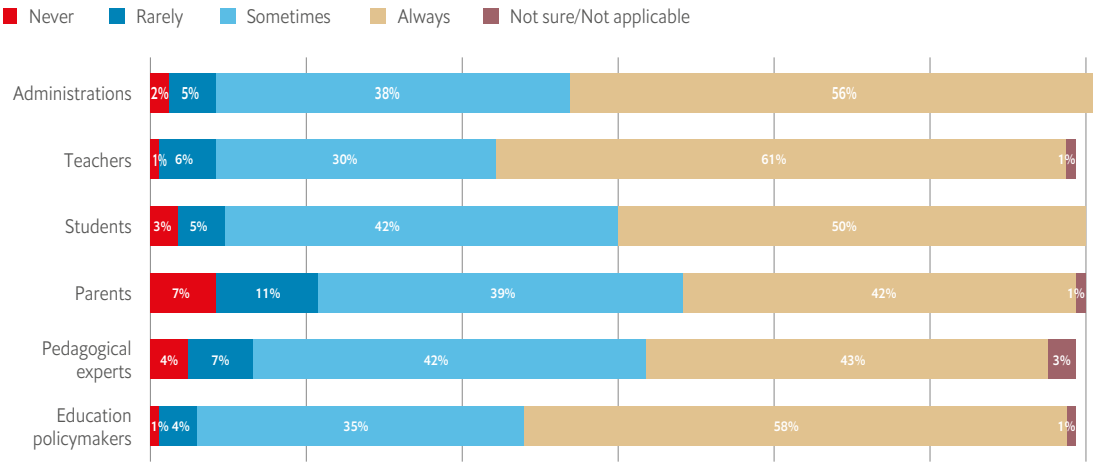
Source: Economist Impact Survey, ed-tech

know what to do with this collected information. They may be tempted to sell it to, or share it with, a company that can derive value from it, in pursuit of potentially socially useful goals. "Students need to understand data are being collected and can be used in different ways", she adds. Finding ways to enhance privacy while still allowing data to flow is vital.

Both sides agree that increased collaboration between educators and technology firms could be part of the solution to these risks and barriers. Historically, says Abdul Chohan, a lack of initiative on the corporate side has created a disconnect between the two. "It really fascinates me the number of ed-tech companies that for many years didn't have a single educator working for them". Education is "too complex a market" not to have in-house expertise, he adds. Fortunately firms in the sector are learning this lesson and hiring educators to ensure that development of their software is learning focused.

Feedback received

To what extent is feedback from the following groups incorporated into the design of your organisations ed-tech products?



Source: Economist Impact Survey, EdTech

In fact, the results suggest that companies and schools are also showing greater interest in working together. But, as ever, there will be inherent challenges. Although many good examples of fruitful cooperation between schools and these businesses exist, says Sheila MacNeill, "fundamentally an economic transaction between a seller and a purchaser is the basis of the relationship, with the tension [that] transaction has". Consider pilot projects. Even when it is possible to agree on appropriate outcome measures—never a certainty—the attitude towards the exercise may differ fundamentally. The company running the trial may see fast failure as an acceptable outcome as it is in much of technology development, whereas the school may find any kind of failure carries too high a risk.

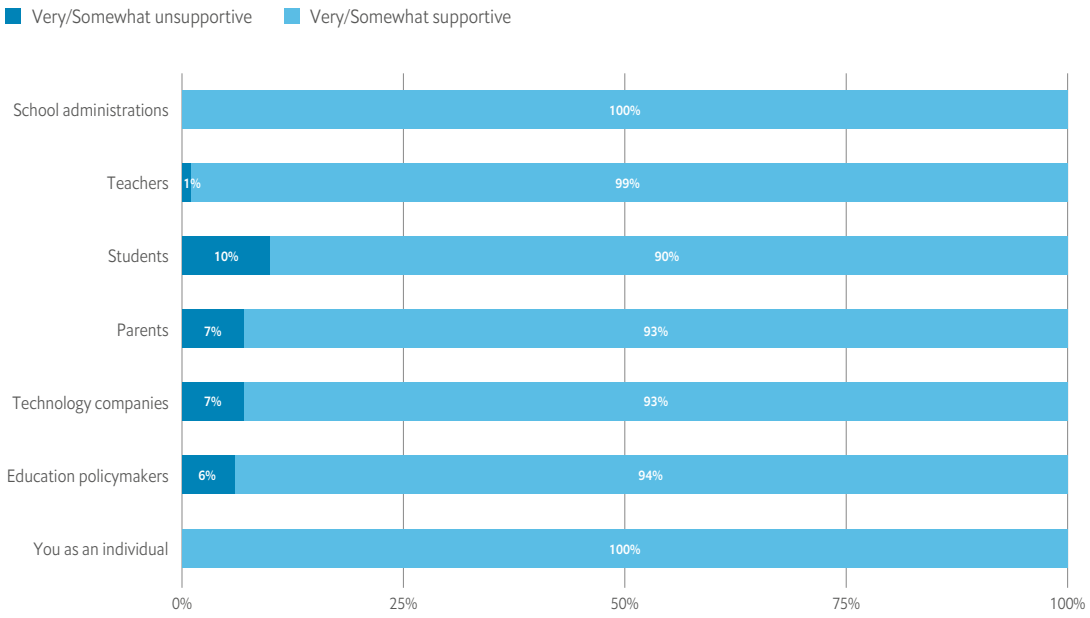
Cooperation might sometimes be difficult but it's not impossible. The organisation LEAP was created for educators and ed-tech innovators to learn from each other. According to CEO and founder Phyliss Lockett "technology providers weren't developing in close proximity to teachers and students". LEAP was designed to allow more direct interaction between ed-tech firms and those working in classrooms, rather than being intermediated by school administrators making the purchasing decisions. "Teachers did not have the technology dictated to them", she explains, "and companies had the chance to get feedback to iterate and make their solutions more effective." The reported impact has been positive but, across the field of education as a whole, "we need more of this to happen".

What do parents and students think?

Getting student support is likely to be crucial to the success of introducing personalised learning, especially where it involves a large level of student agency. According to our surveyed educators, 93% of parents and 90% of students have positive views of personalised learning. However, this masks a nuanced but important difference between their views and those of teachers. 81% of students are only "somewhat supportive", as are 63% of parents. Among teachers, there is a higher level of strong

Tech support

How supportive have the following groups generally been when it comes to incorporating PL practices into the classroom?



Source: Economist Impact Survey, Educators

support. Ed-tech executives also reported that they felt parents and students were generally less supportive than teachers. 25% of our educators report that at their schools, student pushback has been a leading barrier to the introduction of ed-tech.

It starts at home

While there are high levels of support among students and parents, it appears less strong than among teachers—they haven't been won over fully.

Buy-in from these groups is likely to be crucial, especially where learning involves a large level of student agency. According to James Rickabaugh of the Institute of Personalised Learning, students most reluctant to embrace a new system of education are often those who are doing well in the traditional one. For them, personalised learning "is disruptive because it's asking them to be a more active participant, to take more ownership, to see purpose in what they're learning. That's more work, at least initially." He believes that experience with the new system should lead all students to see it as an improvement.

The slight hesitation from parents is no surprise. After all, personalised learning represents a huge shift from the way they were taught in school, and therefore what they think education should look like. "We sat in rows", recalls Phyliss Lockett from LEAP. "We did our homework. We did what we were told." Now, they are being presented with something very different and the history of failed promises and fads in education reform likely adds to parental wariness.

Ultimately, all groups will need to support any changes. According to Richard Parker of the International School of London, there are "three people in the education process: the parent, the child, and the teacher". Education fails "unless there is a very good dialogue that involves listening between them all". Parental engagement is especially important—when they understand what is going on, they can better support the child, which, in turn, leads to improved outcomes. One important tool in helping parents perceive the value of personalised learning, says Kristen Watkins, is letting them experience it for themselves. A particularly useful way to do so, she thinks, is how some schools have "flipped parent night on its head". Parents come in and they get to experience the personalised model with their kids. "It really helps them better understand how their kids are learning." Similarly Phyliss Lockett believes that in several schools where LEAP works, the students now lead parent-teacher conferences and use them as an opportunity to show their accomplishments. More generally, she thinks, parents who see what personalised learning is in practice are usually "thrilled". In short, the experience of those involved in personalised learning is that stakeholders other than teachers can become very supportive. Educators, however, need to take the necessary steps to show members of these groups the value of this approach.

Conclusions

The adoption of personalised learning in school systems is not easy. Alongside investment in technology, our research suggests that cultural, pedagogical, and procedural change will also be needed.

The idea of personalised learning is extremely popular among educators, but there is some uncertainty over what the phrase means in practice. Where it is being implemented, both the lesson designs and choice of technology suggest that most teachers are adopting a 'teacher-led' approach, which in many ways is less disruptive and radical than a 'learner-led' approach. Where exactly on this spectrum schools should sit remains an open question.

Whichever the method, our research suggests three things in particular could help schools deliver on the potential that educators—and to a slightly lesser extent parents and students—clearly recognise.

The first is to find better—and different—ways to measure its effectiveness. According to James Rickabaugh from the Institute for Personalised Learning, without evidence to endorse results amid extensive school accountability systems, educators will be reluctant to proceed with dramatic change. However, most outcomes research related to personalised learning has so far focused on how well ed-tech can contribute to personalised learning—and recent

studies have found that, overall, the findings are "patchy and mixed". John Pane of RAND adds that "the knowledge base is very weak right now", consisting largely of micro-studies, and it is hard to draw any firm conclusions. Perhaps more important is how far personalised learning fits within the existing education system. When judged by traditional metrics, says James Rickabaugh, personalised learning test scores "don't necessarily skyrocket". But advocates stress this misses the point because the traditional approach to measuring academic success is becoming outdated. Based on our survey, personalised learning seems especially good at developing 21st century skills—things like critical thinking and problem solving. Measurement and assessment systems that value these skills could be key to facilitating the growth of personalised learning and there are positive signs this is starting to happen.

Second, and related, is the need for technologists and educators to work together more closely. This can help to improve the sorts of products and technologies available to teachers, which, in turn, may help to reframe and develop better metrics of success. Such collaborative working could also ensure the focus remains on improving learning rather than improving the technology.

Finally, it is vital to encourage buy-in from both parents and students. Teachers already express very high levels of support for personalised learning, and while there is clearly some enthusiasm among students and parents, it appears less strong. That's understandable: for many parents this represents a major change from the way they were taught, and for some students the additional demand of self-reliance can be hard work. But fresh approaches to parent-teacher events demonstrate there are ways to get around that.

Ideally these three changes can reinforce each other. If better technologies, created in partnership with teachers, allow for the collection of more useful data to measure effectiveness, the results may encourage more parents and students to get behind the idea.

Looking more broadly at what personalised learning has to offer, James Rickabaugh believes that the fundamental question is whether "schools are teaching institutions or learning institutions". Discussions surrounding personalised learning are far-reaching because they encompass wider debates about education. Are the long-obvious limitations of current methods of teaching and assessment tolerated because it is what we have always done? Or, for all its faults, do the tried-and-true methods provide the education we want our fellow citizens to have? Are 21st century skills really as important an outcome as literacy and numeracy, so much so that they are worth pursuing more systematically? What combination of pedagogies are best to develop whichever strengths we wish to instil? With what level of agency do we trust learners to direct their own education and at what age?

These are not easy questions to answer and their significance goes beyond school gates. Covid-19 has created an unprecedented occasion to re-think education and schools are being forced to experiment with methods and techniques that in many ways align with personalised learning. The precise shape it takes, however, will depend on what societies decide they need education to be.

Appendix 1: Educator survey

PERSONALISED LEARNING: ED-TECH	
SURVEY DESIGN	
Survey length	~10-minutes (15 questions including demographics/ screeners)
Methodology	CATI + Online
Minimum # of responses	150
Geography	US and UK
Target audience	Manager-level and above respondents working at education technology firms or technology firms providing ed-tech solutions
Function	Range (excl. Finance and HR)
Company size	At least 50% with 50+ employees

Results

	TOTAL	
Q1. In which country are you personally located? Select one.		
United Kingdom	100	33,1%
United States of America	202	66,9%
TOTAL	**302**	**100,0%**

Q2. Which of the following best describes your current role? Select one.		
School teacher	0	0,0%
Assistant principal/assistant headteacher or equivalent	97	32,1%
Vice principal/deputy headteacher or equivalent	114	37,7%
Principal/headteacher or equivalent	91	30,1%
Other school personnel (eg, guidance counsellor, nurse, social worker, etc)	0	0,0%
Other	0	0,0%
Do not care to respond	0	0,0%
TOTAL	**302**	**100,0%**

Q3. Which of the following best describes the kind of school in which you work? Select one.		
Preschool or nursery school (schools for children under the age of 5 years)	0	0,0%
Primary school (schools for children aged 5-11 years)	113	37,4%
Secondary school (schools for children aged 12-18 years)	189	62,6%
TOTAL	**302**	**100,0%**

	TOTAL	
Q4. For how long have you been in your current role? Select one.		
Less than 6 months	0	0,0%
6 months to less than 1 year	4	1,3%
1 - 2 years	95	31,5%
3 - 4 years	131	43,4%
5 - 10 years	64	21,2%
Over 10 years	8	2,6%
Do not care to respond	0	0,0%
TOTAL	**302**	**100,0%**
Q5. How knowledgeable are you about the following? Select one for each row.		
My school's use of personalised learning practices (ie, the instruction in which the pace of learning and the instructional approach are optimised for the needs of each learner.)		
Not at all knowledgeable	0	0,0%
Not very knowledgeable	0	0,0%
Somewhat knowledgeable	132	43,7%
Very knowledgeable	170	56,3%
Not applicable to my school	0	0,0%
TOTAL	**302**	**100,0%**
My school's use of technology-enabled personalised learning tools		
Not at all knowledgeable	0	0,0%
Not very knowledgeable	0	0,0%
Somewhat knowledgeable	123	40,7%
Very knowledgeable	179	59,3%
Not applicable to my school	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Q6. For what kind of school do you currently work? Select one.		
Traditional public/state-run school	128	42,4%
Other publicly-funded school, specify	24	7,9%
Traditional private school	69	22,8%
Boarding school	66	21,9%
Other privately-funded school, specify	15	5,0%
Other, specify	0	0,0%
Do not care to respond	0	0,0%
TOTAL	**302**	**100,0%**
Q7. Compared to other schools in your district, how would you rate your school in the following areas? Select one for each row.		
Standardised test scores		
Significantly below average	0	0,0%
Somewhat below average	15	5,0%
On par with other schools	200	66,2%
Somewhat above average	81	26,8%
Significantly above average	6	2,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Student-teacher ratio		
Significantly below average	1	0,3%
Somewhat below average	34	11,3%
On par with other schools	137	45,4%
Somewhat above average	115	38,1%
Significantly above average	15	5,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Budget per student		
Significantly below average	13	4,3%
Somewhat below average	15	5,0%
On par with other schools	166	55,0%
Somewhat above average	102	33,8%
Significantly above average	6	2,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Use of education technology and digital resources		
Significantly below average	1	0,3%
Somewhat below average	8	2,6%
On par with other schools	34	11,3%
Somewhat above average	116	38,4%
Significantly above average	143	47,4%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Teachers' digital skillset		
Significantly below average	0	0,0%
Somewhat below average	8	2,6%
On par with other schools	28	9,3%
Somewhat above average	142	47,0%
Significantly above average	124	41,1%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Professional development/ training opportunities for teachers		
Significantly below average	0	0,0%
Somewhat below average	10	3,3%
On par with other schools	32	10,6%
Somewhat above average	182	60,3%
Significantly above average	78	25,8%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Access to high-speed broadband		
Significantly below average	0	0,0%
Somewhat below average	0	0,0%
On par with other schools	12	4,0%
Somewhat above average	86	28,5%
Significantly above average	204	67,5%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

Q8. Which of the following teaching practices does your school employ to incorporate personalised learning into the classroom? Select all that apply.		
Learning plans, including goals and content, are tailored to the specific needs of students	219	72,5%
Education technologies and digital tools are used to support students' personalised learning experience	210	69,5%
Lessons are developed based on the interests of students	192	63,6%
Instruction is paced to individual student learning needs	78	25,8%
Students have a say in how, what, when, and where they learn	43	14,2%
Other, specify	0	0,0%
None of the above	0	0,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

Q9. Thinking of your school, how supportive have the following groups generally been with regard to incorporating personalised learning practices into the classroom? Select one for each row.		
School administration		
Very unsupportive	0	0,0%
Somewhat unsupportive	1	0,3%
Somewhat supportive	46	15,2%
Very supportive	255	84,4%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Teachers		
Very unsupportive	0	0,0%
Somewhat unsupportive	2	0,7%
Somewhat supportive	38	12,6%
Very supportive	262	86,8%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Students		
Very unsupportive	8	2,6%
Somewhat unsupportive	23	7,6%
Somewhat supportive	246	81,5%
Very supportive	25	8,3%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Parents		
Very unsupportive	2	0,7%
Somewhat unsupportive	19	6,3%
Somewhat supportive	203	67,2%
Very supportive	78	25,8%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Technology companies		
Very unsupportive	1	0,3%
Somewhat unsupportive	20	6,6%
Somewhat supportive	114	37,7%
Very supportive	167	55,3%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Education policymakers		
Very unsupportive	2	0,7%
Somewhat unsupportive	17	5,6%
Somewhat supportive	197	65,2%
Very supportive	86	28,5%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
You as an individual		
Very unsupportive	0	0,0%
Somewhat unsupportive	0	0,0%
Somewhat supportive	18	6,0%
Very supportive	284	94,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

Q10. Which of the following skill sets would personalised learning be most helpful for developing in students? Select up to five.

Problem solving	210	69,5%
Critical thinking	207	68,5%
Creativity	159	52,6%
Confidence	154	51,0%
Communication	150	49,7%
Self-advocacy	122	40,4%
Perseverance	122	40,4%
Resilience and coping	121	40,1%
Collaboration	104	34,4%
Work ethic	84	27,8%
Other, specify	0	0,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Q11. For each of the following pairs of students, which group do you think would most benefit from personalised learning? Select one for each row.		
High-achieving students		
Much more beneficial	29	9,6%
Somewhat more beneficial	26	8,6%
Equally beneficial	66	21,9%
Somewhat more beneficial	105	34,8%
Much more beneficial	76	25,2%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Younger students (under 12 years)		
Much more beneficial	59	19,5%
Somewhat more beneficial	60	19,9%
Equally beneficial	115	38,1%
Somewhat more beneficial	43	14,2%
Much more beneficial	25	8,3%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Q12. What are the most concerning risks associated with the increased use of personalised learning practices in the classroom? Select up to three.		
Potential impact on students' social development outcomes from limited interaction with teachers or other students	184	60,9%
Students developing overreliance on technology	140	46,4%
Students being disadvantaged when applying to colleges or universities that only recognise traditional forms of evaluation or assessment (eg, standardised test scores)	118	39,1%
Breach of student privacy	89	29,5%
Inability to measure effectiveness of programmes	82	27,2%
Teacher burnout	54	17,9%
Misuse of student data	53	17,5%
Lack of existing evidence to support personalised learning	32	10,6%
Technology exacerbating existing inequalities	25	8,3%
Other, specify	0	0,0%
There are no risks	0	0,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

Q13. Which of the following kinds of education technologies does your school currently employ to support students' personalised learning experiences? Which is your school planning to use more of, or start using, in the next 2 years? Select all that apply for each row.		
Learning network orchestrators (LNO)		
Currently using	3	1,0%
Planning to increase use or start using in the next 2 years	82	27,2%
Not currently using and have no plans to use	97	32,1%
Not sure/ Not applicable	120	39,7%
TOTAL	**302**	**100,0%**
Intelligent tutoring systems (ITS)		
Currently using	128	42,4%
Planning to increase use or start using in the next 2 years	143	47,4%
Not currently using and have no plans to use	18	6,0%
Not sure/ Not applicable	16	5,3%
TOTAL	**302**	**100,0%**

	TOTAL	
Exploratory (or open-learning) learning environments (ELE)		
Currently using	139	46,0%
Planning to increase use or start using in the next 2 years	85	28,1%
Not currently using and have no plans to use	52	17,2%
Not sure/ Not applicable	26	8,6%
TOTAL	**302**	**100,0%**
Learning management systems (LMS)		
Currently using	279	92,4%
Planning to increase use or start using in the next 2 years	32	10,6%
Not currently using and have no plans to use	7	2,3%
Not sure/ Not applicable	1	0,3%
TOTAL	**302**	**100,0%**
Digital game-based learning tools		
Currently using	95	31,5%
Planning to increase use or start using in the next 2 years	79	26,2%
Not currently using and have no plans to use	115	38,1%
Not sure/ Not applicable	15	5,0%
TOTAL	**302**	**100,0%**
Dialogue-based tutoring systems		
Currently using	71	23,5%
Planning to increase use or start using in the next 2 years	67	22,2%
Not currently using and have no plans to use	156	51,7%
Not sure/ Not applicable	10	3,3%
TOTAL	**302**	**100,0%**
Virtual agents		
Currently using	25	8,3%
Planning to increase use or start using in the next 2 years	107	35,4%
Not currently using and have no plans to use	129	42,7%
Not sure/ Not applicable	41	13,6%
TOTAL	**302**	**100,0%**

	TOTAL	
Assistive technologies for students with special education needs (SEN)		
Currently using	31	10,3%
Planning to increase use or start using in the next 2 years	98	32,5%
Not currently using and have no plans to use	119	39,4%
Not sure/ Not applicable	55	18,2%
TOTAL	**302**	**100,0%**
Other, specify		
Currently using	0	0,0%
Planning to increase use or start using in the next 2 years	0	0,0%
Not currently using and have no plans to use	0	0,0%
Not sure/ Not applicable	0	0,0%
TOTAL	**302**	**100,0%**

Q14. What have been the main barriers to your school incorporating these education technologies and tools into the classroom? Select up to three.		
Insufficient funding	158	52,3%
Ethical concerns around the collection and use of student data	81	26,8%
Student pushback	74	24,5%
Insufficient or outdated technology infrastructure	61	20,2%
Lack of leadership support	56	18,5%
Inconsistent implementation from classroom to classroom	53	17,5%
Insufficient training for teachers due to rushed deployment of technology during the pandemic	52	17,2%
Lack of appropriate technology solutions for my school	47	15,6%
Teacher pushback	37	12,3%
Insufficient classroom space	33	10,9%
Lack of student access to wifi/computers at home	24	7,9%
Parent pushback	23	7,6%
Other, specify	0	0,0%
We have not experienced any barriers	0	0,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Q15. What are the most important decision-making criteria when your school is evaluating a new education technology to potentially adopt? Select up to three.		
Cost	176	58,3%
Suitable for wide range of student backgrounds	170	56,3%
Ease of use for students	136	45,0%
Clear impact on student learning outcomes	136	45,0%
Transparency around collection and use of student data	61	20,2%
Scalability	59	19,5%
Teacher training options	52	17,2%
Brand reputation	28	9,3%
Proof of responsible design (ie, technology is accountable and inclusive)	23	7,6%
Ease of use for teachers	18	6,0%
Other schools are already using it	7	2,3%
Other, specify	0	0,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

Q16.Thinking of the next 5 years, how likely are the following scenarios? Select one for each row.		
My school's use of personalised learning technologies and tools will increase		
Highly unlikely	0	0,0%
Somewhat unlikely	19	6,3%
Somewhat likely	55	18,2%
Highly likely	227	75,2%
Not sure	1	0,3%
TOTAL	**302**	**100,0%**
Budget allocated to personalised learning programmes at my school will increase		
Highly unlikely	2	0,7%
Somewhat unlikely	24	7,9%
Somewhat likely	159	52,6%
Highly likely	117	38,7%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Most schools in my country will have personalised learning programmes in place		
Highly unlikely	0	0,0%
Somewhat unlikely	6	2,0%
Somewhat likely	163	54,0%
Highly likely	70	23,2%
Not sure	63	20,9%
TOTAL	**302**	**100,0%**

Q17. To what extent do you agree or disagree with the following statements?
Select one for each row.

Providing students with a personalised learning experience is a priority for my school		
Strongly disagree	15	5,0%
Somewhat disagree	10	3,3%
Somewhat agree	144	47,7%
Strongly agree	133	44,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Teachers at my school have the right training, resources, and support in order to implement personalised learning in the classroom		
Strongly disagree	0	0,0%
Somewhat disagree	20	6,6%
Somewhat agree	98	32,5%
Strongly agree	184	60,9%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Teachers at my school have the necessary digital skills to effectively leverage personalised learning technologies in the classroom		
Strongly disagree	0	0,0%
Somewhat disagree	18	6,0%
Somewhat agree	100	33,1%
Strongly agree	184	60,9%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

	TOTAL	
Personalised learning technologies can help teachers adapt their teaching methods to the diverse needs of marginalised learners		
Strongly disagree	1	0,3%
Somewhat disagree	13	4,3%
Somewhat agree	132	43,7%
Strongly agree	156	51,7%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
The covid-19 pandemic has made personalised learning more relevant than ever		
Strongly disagree	0	0,0%
Somewhat disagree	3	1,0%
Somewhat agree	209	69,2%
Strongly agree	90	29,8%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
The covid-19 pandemic accelerated my school's adoption of personalised learning		
Strongly disagree	0	0,0%
Somewhat disagree	3	1,0%
Somewhat agree	145	48,0%
Strongly agree	154	51,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
Increased collaboration between schools and education technology providers is necessary for developing effective digital tools		
Strongly disagree	0	0,0%
Somewhat disagree	4	1,3%
Somewhat agree	111	36,8%
Strongly agree	186	61,6%
Not sure	1	0,3%
TOTAL	**302**	**100,0%**

	TOTAL	
Personalised learning offers a better quality of education than traditional classroom learning		
Strongly disagree	13	4,3%
Somewhat disagree	16	5,3%
Somewhat agree	137	45,4%
Strongly agree	136	45,0%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
The quick shift to remote learning during the pandemic has made us too focused on the technology side of personalised learning		
Strongly disagree	0	0,0%
Somewhat disagree	6	2,0%
Somewhat agree	182	60,3%
Strongly agree	114	37,7%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**
The human element is just as important as technology for the successful implementation of personalised learning in the classroom		
Strongly disagree	0	0,0%
Somewhat disagree	1	0,3%
Somewhat agree	114	37,7%
Strongly agree	187	61,9%
Not sure	0	0,0%
TOTAL	**302**	**100,0%**

Appendix 2: Ed-tech survey

PERSONALISED LEARNING: ED-TECH	
SURVEY DESIGN	
Survey length	~10-minutes (15 questions including demographics/ screeners)
Methodology	CATI + Online
Minimum # of responses	150
Geography	US and UK
Target audience	Manager-level and above respondents working at education technology firms or technology firms providing ed-tech solutions
Function	Range (excl. Finance and HR)
Company size	At least 50% with 50+ employees

Results

	TOTAL	
Q1. In which country are you personally located? Select one.		
United Kingdom	76	50,3%
United States of America	75	49,7%
TOTAL	**151**	**100,0%**

Q2. What is your organisation's primary industry? Select one.		
Financial services	0	0,0%
Healthcare	0	0,0%
Manufacturing	0	0,0%
Media & entertainment	0	0,0%
Retail	0	0,0%
Travel and hospitality	0	0,0%
Education technology	88	58,3%
IT/Technology	63	41,7%
Other	0	0,0%
Do not care to respond	0	0,0%
TOTAL	**151**	**100,0%**

Q3. Does your organisation develop or provide technology products or solutions for use in schools or the wider education sector (eg, education software, learning management systems, student information systems, classroom management software, language learning software, etc.)? Select one.		
Yes	63	100,0%
No	0	0,0%
Do not care to respond	0	0,0%
TOTAL	**63**	**100,0%**

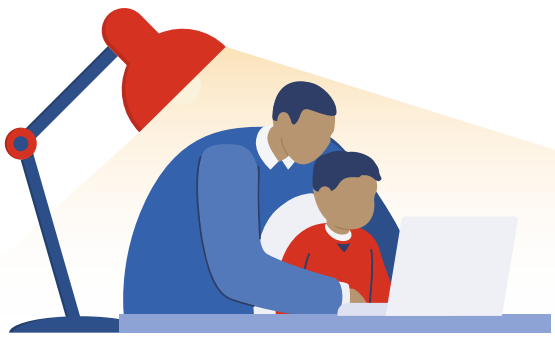
	TOTAL	
Q4. Which of the following best describes your title? Select one.		
C-level executive	20	13,2%
Managing director	19	12,6%
VP/SVP/EVP	26	17,2%
Director	28	18,5%
Head of business unit or department	12	7,9%
Senior manager	21	13,9%
Manager	25	16,6%
Other	0	0,0%
Do not care to respond	0	0,0%
TOTAL	**151**	**100,0%**

Q5. Which of the following best describes your main functional role? Select one.		
Finance	0	0,0%
General management	13	8,6%
Human resources	0	0,0%
Marketing and sales	23	15,2%
IT/Technology	19	12,6%
IT Helpdesk/Support	0	0,0%
Operations	18	11,9%
Product management or development	22	14,6%
R&D	22	14,6%
Software engineering or development	18	11,9%
Strategy and business development	16	10,6%
Other, specify	0	0,0%
Do not care to respond	0	0,0%
TOTAL	**151**	**100,0%**

	TOTAL	
Q6. How many employees work for your organisation globally? Select one.		
Fewer than 50 employees	59	39,1%
50 to less than 200 employees	33	21,9%
200 to less than 500 employees	25	16,6%
500 to less than 1,000 employees	17	11,3%
1,000 employees or more	17	11,3%
Do not care to respond	0	0,0%
TOTAL	**151**	**100,0%**

Q7. How knowledgeable are you about personalised learning (ie, the instruction in which the pace of learning and the instructional approach are optimised for the needs of each learner)? Select one.		
Not knowledgeable at all	0	0,0%
Not very knowledgeable	0	0,0%
Somewhat knowledgeable	51	33,8%
Very knowledgeable	100	66,2%
Do not care to respond	0	0,0%
TOTAL	**151**	**100,0%**

Q8. To what extent are you involved in or have influence over how your organisation designs and develops its education technology products or solutions? Select one.		
Not at all	0	0,0%
Not very	0	0,0%
Somewhat	59	39,1%
Very	92	60,9%
Do not care to respond	0	0,0%
TOTAL	**151**	**100,0%**



Q9. To what extent is feedback or input from the following groups incorporated into the design and development of your organisation's education technology products and solutions? Select one for each row.	TOTAL	
School administrations		
Never	3	2,0%
Rarely	7	4,6%
Sometimes	57	37,7%
Always	84	55,6%
Not sure/ Not applicable	0	0,0%
TOTAL	**151**	**100,0%**
Teachers		
Never	2	1,3%
Rarely	9	6,0%
Sometimes	46	30,5%
Always	92	60,9%
Not sure/ Not applicable	2	1,3%
TOTAL	**151**	**100,0%**
Students		
Never	5	3,3%
Rarely	7	4,6%
Sometimes	64	42,4%
Always	75	49,7%
Not sure/ Not applicable	0	0,0%
TOTAL	**151**	**100,0%**
Parents		
Never	10	6,6%
Rarely	17	11,3%
Sometimes	59	39,1%
Always	64	42,4%
Not sure/ Not applicable	1	0,7%
TOTAL	**151**	**100,0%**

	TOTAL	
Pedagogical experts		
Never	6	4,0%
Rarely	11	7,3%
Sometimes	64	42,4%
Always	65	43,0%
Not sure/ Not applicable	5	3,3%
TOTAL	**151**	**100,0%**
Education policymakers		
Never	2	1,3%
Rarely	6	4,0%
Sometimes	53	35,1%
Always	88	58,3%
Not sure/ Not applicable	2	1,3%
TOTAL	**151**	**100,0%**
Other, specify		
Never	0	0,0%
Rarely	1	25,0%
Sometimes	2	50,0%
Always	1	25,0%
Not sure/ Not applicable	0	0,0%
TOTAL	**4**	**100,0%**

Q10. Feedback from which of the following groups is most critical to take into account to design and develop an effective education technology product or solution?
Select up to three.

Teachers	90	59,6%
School administrations	75	49,7%
Students	72	47,7%
Education policymakers	68	45,0%
Pedagogical experts	61	40,4%
Parents	41	27,2%
Other, specify	0	0,0%
Not sure	0	0,0%
TOTAL	**151**	**100,0%**

	TOTAL	
Q11. How does your organisation account for potential biases or inequities in the design, development and use of its education technology products and solutions? Select all that apply.		
Providing training or guidelines to enable employees to identify potential risks during development (eg, unfair bias, data privacy concerns, etc.)	113	74,8%
Providing training or guidelines for schools to identify potential risks during use	100	66,2%
Incorporating feedback from end-users into the design and development processes	91	60,3%
Hiring employees with diverse skills and backgrounds	86	57,0%
Leveraging diverse and representative data sources	73	48,3%
Other, specify	0	0,0%
Not sure	0	0,0%
TOTAL	**151**	**100,0%**

Q12. Based on your experience, which of the following is most important for schools to have in order to successfully implement education technologies and tools into class-rooms? Select up to three.		
Leadership buy-in	82	54,3%
Consistent implementation from classroom to classroom	59	39,1%
Sufficient funding	55	36,4%
Sufficient training opportunities for teachers	52	34,4%
Student buy-in	36	23,8%
Teacher buy-in	35	23,2%
Robust technology infrastructure	32	21,2%
Sufficient classroom space	29	19,2%
Student access to wifi/computers at home	29	19,2%
Parent buy-in	21	13,9%
Other, specify	0	0,0%
Not sure	1	0,7%
TOTAL	**151**	**100,0%**

	TOTAL	
Q13. What do you think are the most important decision-making criteria for schools when evaluating a new education technology to potentially adopt? Select up to three.		
Clear impact on student learning outcomes	63	41,7%
Ease of use for teachers	54	35,8%
Cost	49	32,5%
Ease of use for students	49	32,5%
Teacher training options	42	27,8%
Suitable for wide range of student backgrounds	42	27,8%
Transparency around collection and use of student data	37	24,5%
Other schools are already using it	34	22,5%
Scalability	33	21,9%
Brand reputation	19	12,6%
Proof of responsible design (ie, technology is accountable and inclusive)	16	10,6%
Other, specify	0	0,0%
Not sure	1	0,7%
TOTAL	**151**	**100,0%**

Q14. Based on your experience, how supportive have the following groups generally been with regard to incorporating personalised learning practices into the classroom? Select one for each row.		
School administrations		
Very unsupportive	0	0,0%
Somewhat unsupportive	7	4,6%
Somewhat supportive	55	36,4%
Very supportive	89	58,9%
Not sure	0	0,0%
TOTAL	**151**	**100,0%**
Teachers		
Very unsupportive	2	1,3%
Somewhat unsupportive	4	2,6%
Somewhat supportive	55	36,4%
Very supportive	90	59,6%
Not sure	0	0,0%
TOTAL	**151**	**100,0%**

	TOTAL	
Students		
Very unsupportive	1	0,7%
Somewhat unsupportive	8	5,3%
Somewhat supportive	73	48,3%
Very supportive	66	43,7%
Not sure	3	2,0%
TOTAL	**151**	**100,0%**
Parents		
Very unsupportive	3	2,0%
Somewhat unsupportive	10	6,6%
Somewhat supportive	76	50,3%
Very supportive	57	37,7%
Not sure	5	3,3%
TOTAL	**151**	**100,0%**
Technology companies		
Very unsupportive	2	1,3%
Somewhat unsupportive	4	2,6%
Somewhat supportive	61	40,4%
Very supportive	82	54,3%
Not sure	2	1,3%
TOTAL	**151**	**100,0%**
Education policymakers		
Very unsupportive	0	0,0%
Somewhat unsupportive	10	6,6%
Somewhat supportive	69	45,7%
Very supportive	70	46,4%
Not sure	2	1,3%
TOTAL	**151**	**100,0%**

	TOTAL	
You as an individual		
Very unsupportive	0	0,0%
Somewhat unsupportive	4	2,6%
Somewhat supportive	43	28,5%
Very supportive	102	67,5%
Not sure	2	1,3%
TOTAL	**151**	**100,0%**
Other, specify		
Very unsupportive	0	0,0%
Somewhat unsupportive	0	0,0%
Somewhat supportive	0	0,0%
Very supportive	1	50,0%
Not sure	1	50,0%
TOTAL	**151**	**100,0%**

Q15. To what extent do you agree or disagree with the following statements?
Select one for each row.

My organisation has a good understanding of the problems schools are currently facing in my country		
Strongly disagree	0	0,0%
Somewhat disagree	5	3,3%
Somewhat agree	59	39,1%
Strongly agree	87	57,6%
Not sure	0	0,0%
TOTAL	**151**	**100,0%**
Companies that can show the responsible design and development of their products will have a competitive advantage		
Strongly disagree	0	0,0%
Somewhat disagree	8	5,3%
Somewhat agree	51	33,8%
Strongly agree	92	60,9%
Not sure	0	0,0%
TOTAL	**151**	**100,0%**

	TOTAL	
Strict regulations around the collection and use of student data prevent innovation in my industry		
Strongly disagree	6	4,0%
Somewhat disagree	27	17,9%
Somewhat agree	62	41,1%
Strongly agree	53	35,1%
Not sure	3	2,0%
TOTAL	**151**	**100,0%**
Lack of access to research and development in schools is a barrier to innovation for my industry		
Strongly disagree	5	3,3%
Somewhat disagree	21	13,9%
Somewhat agree	67	44,4%
Strongly agree	57	37,7%
Not sure	1	0,7%
TOTAL	**151**	**100,0%**
The covid-19 pandemic has made technology an integral component to education		
Strongly disagree	1	0,7%
Somewhat disagree	6	4,0%
Somewhat agree	48	31,8%
Strongly agree	92	60,9%
Not sure	4	2,6%
TOTAL	**151**	**100,0%**
Increased collaboration between schools and education technology providers is necessary for developing effective digital tools		
Strongly disagree	1	0,7%
Somewhat disagree	9	6,0%
Somewhat agree	40	26,5%
Strongly agree	100	66,2%
Not sure	1	0,7%
TOTAL	**151**	**100,0%**

ECONOMIST IMPACT

LONDON

20 Cabot Square
London, E14 4QW
United Kingdom
Tel: (44.20) 7576 8000
Fax: (44.20) 7576 8500
Email: london@eiu.com

GENEVA

Rue de l'Athénée 32
1206 Geneva
Switzerland
Tel: (41) 22 566 2470
Fax: (41) 22 346 93 47
Email: geneva@eiu.com

NEW YORK

750 Third Avenue
5th Floor
New York, NY 10017
United States
Tel: (1.212) 554 0600
Fax: (1.212) 586 1181/2
Email: americas@eiu.com

DUBAI

Office 1301a
Aurora Tower
Dubai Media City
Dubai
Tel: (971) 4 433 4202
Fax: (971) 4 438 0224
Email: dubai@eiu.com

HONG KONG

1301
12 Taikoo Wan Road
Taikoo Shing
Hong Kong
Tel: (852) 2585 3888
Fax: (852) 2802 7638
Email: asia@eiu.com

SINGAPORE

8 Cross Street
#23-01 Manulife Tower
Singapore
048424
Tel: (65) 6534 5177
Fax: (65) 6534 5077
Email: asia@eiu.com