CLASSVR®

A Pivotal Decade:

New Thinking and Technologies Reshaping Education

Introduction

"You can't stop the waves, but you can learn to surf."

Jon Kabat-Zinn

As we approach the halfway point of the decade, it's clear that we're in the midst of a globally transformative era in education. The UK needs to keep pace, or risk falling behind.

Decisions made today will shape UK education for years to come. In turn, this will forever influence the trajectory of millions of students' lives.

This pivotal decade is being shaped by the confluence of two potent forces: firstly, the evolving expectations of UK learners; secondly, the rapidly shifting contours of the world they are poised to enter.

To give an example of the latter: educators are only just beginning to get to grips with first-wave AI, and its impact on classrooms and students' future careers. But it's already time to consider what's coming next: the arrival of artificial general intelligence (AGI) – i.e. AI that can truly 'think', and at inhuman speeds and scales.

Just a couple of years ago, computing experts predicted that AGI would be with us by 2050 at the earliest. Thanks to recent advances in AI development, however, AGI's ETA has been slashed: 2023 research by the University of Oxford found that AGI now has an "earliest possible arrival date of 2028" – i.e. before the end of the decade.

What the arrival of AGI will mean for today's students – tomorrow's workers – is hard to predict. All we can say for certain is that we need to prepare them for it, as thoughtfully and strategically as we can. We can't stop the waves, but we can learn to surf.

Thankfully, students are already laying the groundwork. The children of today are digital natives, born into a world where information flows freely and unceasingly. Traditional modes of teaching are currently being reshaped by students' unprecedented aptitude for technology, and by the ways in which technology is strengthening their relationship with learning.

For today's pupils, teachers and textbooks no longer represent their sole gateways to knowledge. Almost all have ready access to devices that can instantly connect them to pretty much the sum total of all human knowledge – wherever and whenever they like.

Granted, today's UK schoolchildren aren't using technology purely for studious reasons. But they do view technology as an integral and invaluable part of their day-to-day learning – as do their parents.

A 2023 study by Ofcom ('Children and Parents: Media Use and Attitudes') found that 81% of UK children (aged 6–17) and 84% of parents and children identified 'learning' as a positive aspect of being online. And many children are using devices for more than just schoolwork. For example: 12% of children had taught themselves how to code using one of their devices.

It doesn't stop there. Children are independently using their household technology to learn everything from music production to animation; from cookery to strength training.

The majority of today's students are voraciously hungry for knowledge: 95% of the children in Ofcom's study stated that they enjoyed learning new things. If educators can marry this willingness to learn with technology's potency as a teaching tool, the next generation's future looks bright.

All of this may require making adjustments – minor and major – to current pedagogical thinking. These adjustments could relate not only to the implementation of new technologies, but to any and every aspect of students' school lives, from homework to mental wellbeing. The rapidfire innovations of the 2020s are transforming society, and schools need to react holistically in order to keep pace.

In this whitepaper, we embark on an exploratory journey, delving into the myriad ways that UK schools are embracing novel methodologies and cutting-edge technologies. You will probably already be familiar with some of the new educational approaches highlighted in this report; others may be new to you. Whatever your level of familiarity with these topics, we've sought to provide fresh insights and perspectives on them all.

We'll explore the potentially profound impacts of these emerging approaches and technologies, all of them intended to pave the way for a more socioculturally attuned and forward-thinking education system.

Meet the experts

We've asked five educational experts to share their thoughts on the emerging approaches and technologies highlighted in this report. Each of them brings a career's worth of knowledge and experience, alongside their own unique personal perspective.

Dr Rupert Rawnsley
Chief Science Officer
Avantis Education
View LinkedIn profile

Based in Gloucester, England, Dr Rawnsley is an expert in computing and telecommunications, with decades of experience bringing successful solutions to market. He currently leads software and hardware development for Avantis Education.

Simon Luxford-Moore
Head of eLearning
ESMS independent schools
View LinkedIn profile

An edtech pioneer with a career-long focus on accessibility and differentiation, Luxford-Moore oversees eLearning at the acclaimed ESMS family of independent schools. He is based in Edinburgh, Scotland.

Dominic Broad
Director of Education
Thrive Education Partnership
View LinkedIn profile

Currently Director of Education for a multi-academy trust in the Midlands, Broad is also a former headteacher; a contributor to government advisory panels; a member of Pearson's Digital Round Table; and host of the hugely popular Olympic Mindset Podcast.

Luke Knightly-Jones
Education researcher and private tutor
Royal Tutors
View LinkedIn profile

Knightly-Jones is the Royal Tutor to principal members of the ruling families in Saudi Arabia and Qatar, and an educational advisor to a number of globally affluent families. He is currently completing PhD research into educational VR and AR.

Dr Louah Sirri
Senior Lecturer in Educational Psychology
Manchester Metropolitan University
View profile

A lecturer at Manchester Metropolitan University in the UK, Dr Sirri's recent published work includes the editorial piece 'Neurobehavioral changes in language learning' in Frontiers in Communication, and the chapter 'Cognitive development' in the 2022 textbook 'Psychology of Education: Theory, Research and Evidence-Based Practice'.

Daniel Byrant
Founder Director
Collaborative Realities
View LinkedIn profile

Daniel Bryant is a former educator and an award-winning edtech consultant. He specialises in leveraging emerging technologies for high-impact learning. Bryant advises educational institutions, SMEs and nonprofits across the UK.

Contents

The flipped classroom

Turning teaching on it's head

The flipped classroom model inverts the standard pedagogical approach of having students consume educational resources in class, and then produce work based on those resources at home.

In a flipped classroom, students instead learn new material independently, outside of class – most often through videos or other online resources – and then come to class to discuss, apply and collaborate on what they've learned. In the classroom, the focus moves away from the teacher and onto the students. Flipped-classroom proponents view this as a more effective and efficient use of both the educator and the students' time.

The definitive origination of the flipped classroom isn't clear, but the approach was most famously pioneered in the 1990s by Harvard University physics educator Dr Eric Mazur. In 2006, Colorado-based chemistry teachers Jonathan Bergmann and Aaron Sams introduced the concept to US high schools when they began distributing pre-recorded lectures to their students. Bergmann and Sams went on to become evangelists for flipped learning, and eventually published a widely cited book on the subject, 2012's Flip Your Classroom: Reach Every Student in Every Class Every Day.

The pandemic drove UK adoption of flipped classrooms, as the nation's educators found themselves distanced from their students and newly reliant on digital resources. Impressed with the results of their enforced rethink of teaching methods, some chose, post-pandemic, not to return to 'traditional' pedagogy.

"With flipped learning, the *teacher* becomes the classroom resource," says edtech consultant – and former educator – Daniel Bryant of Collaborative Realities. "They're on hand to answer questions; to talk through the pre-read material with students and help them attain the required level of understanding. The thinking is: why deliver a PowerPoint presentation in the classroom? Students could consume that presentation in their own time."

As effective as the flipped classroom can be, it has its potential disadvantages. For one thing, it relies on students being motivated enough – and having the necessary cognitive capabilities – to consume the learning materials given to them. If a student arrives in a practical-driven biology class having failed to watch the teacher's pre-recorded lecture, they're going to be immediately lost.

"We know from neuroscientific research that students' individual differences are a really important factor in learning," says educational psychologist Dr Louah Sirri. "Everyone has a different style of learning; everyone has different cognitive capacities. And so the independent learning of the flipped classroom might work well for some, but not for others."

Another potential issue is the need for teachers to produce high-quality digital content that will engage and educate students outside of the class environment – particularly where that content takes the form of a video lesson.

"It's challenging for some teachers to adjust to the flipped classroom, because it is a very different type of teaching," says Rawnsley. "And they're sometimes reluctant to record themselves teaching on camera."

There are also digital divide issues to consider. For underprivileged students who don't have ready access to screens and/or an internet connection, the consumption of digital learning content at home will be an issue.

"You have to remember that 1.7 million UK households have no broadband or mobile internet access," says Dominic Broad, Director of Education at the Thrive Education Partnership. "Unfortunately, there's a correlation between schools in deprived areas having to stretch their budgets, and deprived communities not having the opportunity to donate devices or invest in better broadband connectivity.

"The question is, how do we bring some sort of parity to the table? Yes, technology provides equity for students from all backgrounds, because ultimately, technology can provide them with almost anything. But if those students don't have access to the technology they need to gain that equity, then we're simply creating a divide that is only going to grow over time."

For younger children, or children with special educational needs, the flipped-learning model may also prove unsuitable.

"The flipped-classroom approach became popular during the pandemic," says Simon Luxford-Moore, head of eLearning at the ESMS family of independent schools in the UK. "The problem was, it shifted the onus onto students and parents to ensure that the required learning was done. And from speaking to colleagues and to peers at other schools, I know that, quite often, the necessary support simply wasn't there."

The UK Department for Education's official line on flipped learning is one of caution, but not outright dismissal. In its 2021 report on online and blended learning, the DfE stated that "despite its popularity, and a range of theories about why the approach might be beneficial, there have been very few high-quality studies of the impact of flipped learning programmes on student outcomes."

The report continues: "The main concern is that flipped approaches risk leaving struggling students to their own devices at the initial stages. While flipping may benefit more proficient students it may be exclusionary to low-engaged, peripheral students."

Further reading

A critical review of flipped classroom challenges in K-12 education: possible solutions and recommendations for future research

Published by The National Library of Medicine, 2017

"Flipping does have its benefits. Flipped learning as active learning increases students' levels of participation and engagement in learning and there are **students who genuinely like learning using technological devices.** So I, too, employ the tech and techniques, but the message should be that it cannot become the only delivery method in a classroom and must be considered more carefully."

Dr Nicole Brown
Director of Social Research & Practice and Education Ltd.,
University College London

AI-generated teaching materials

The cutting edge meets the classroom

Artificial intelligence – AI – is fast establishing itself as the defining technological tool of the decade. It's a transformative force, impacting every aspect of society, including the ways in which we learn and teach.

One of the most promising applications of AI in education is the creation of teaching materials that are not only engaging and effective, but also adaptive and endlessly iterative.

Traditionally, the development of teaching materials has been a labor-intensive and time-consuming endeavor. Using generative AI, however, teachers can create highly polished assets – slide decks, quizzes, subject summaries, even full lesson plans – in minutes.

Teachers can achieve this by using AIs such as ChatGPT (from OpenAI/Microsoft) or Bard (from Google) to generate text that provides information or ideas around virtually any subject, using just a simple, conversational prompt – e.g. 'Outline how photosynthesis works, in bullet point form'.

AIs can also analyse or repurpose existing content. They can provide analytical feedback on student essays, for example. They can convert a dry and lengthy passage of text into snappy discussion points, or a multiple-choice quiz, or a script for a video lesson.

AIs can even rewrite a lesson plan aimed at a specific grade level to make it better suited to younger or older students.

All-purpose generative AIs such as ChatGPT and Bard can be used in conjunction with other types of generative AI to further boost teachers' capabilities, and save them serious amounts of prep time.

For example: text generated in ChatGPT can be instantly converted into a slick-looking slide deck using the Google Slides add-on SlidesAI.io. This deck could then be rounded out with data charts created by ChartGPT, and made visually appealing with professional-quality illustrations generated by Midjourney. What would otherwise be hours of painstaking work can instead be performed during a single recess period.

"There's enormous potential power in AI," says edtech expert Dr Rupert Rawnsley. "It's an amplifier for our intellectual abilities, in the same way that earlier computing paradigms have been. But if you're using AI in an educational context, there are a number of considerations to be made, and potential risks that need to be factored in.

"Firstly, you've got to make sure that the AI's factual output is accurate. AI can be prone to what's known as 'hallucination', whereby it will randomly extrapolate some spurious fact. So fact-checking is vital.

"Then you've got to ensure that AI-generated content meets educational standards of decency. That's a slightly nebulous concept, but it's usually a case of 'you know it when you see it'.

"Next, you have to make sure you're not infringing someone else's IP [intellectual property]. So this would be relevant to, for example, a teacher generating a slide deck, and the AI draws heavy inspiration from another slide deck that's been posted to, say, TeachersPayTeachers.com. And then, unbeknownst to that teacher, that AI-generated slide deck they're now using in the classroom is actually infringing someone else's IP.

"Finally, there's a need to ensure that any information you feed into an AI is going to remain private. So for instance, one of the great strengths of AI is that it allows for greater personalization. You no longer have to teach a one-size-fits-all approach. You can potentially offer automatically individualized lessons to every student, because the AI will learn what their strengths and weaknesses are, and will respond by focusing on certain areas.

"So, just as a teacher would know that 'Student A' always struggles with abstract concepts, but responds well to practical examples, an AI will learn that too, and will generate tailored learning materials for 'Student A' in response. The risk is, you're telling the AI algorithm – and the *owner* of the algorithm – an awful lot about the students in your classroom. Very deep and personal data. So you've got to be careful about what you share with an AI."

However, Dr Rawnsley stresses that while there is some apprehension around AI right now, it presents too great of an opportunity to educators to be dismissed out-of-hand. "AI-generated teaching resources are just like any other resources: there are certain caveats to be aware of. Everything that comes *out* of an AI needs to be reviewed, and everything that gets put *into* an AI should be carefully considered."

We're not yet at the stage of having generative AIs create strategically individualized teaching materials for every student in a primary or secondary class. But considering how fast both the evolution and adoption of AI has been in the last year, it's hardly a fantastical or far-off possibility. Getting past educators' concerns around student privacy and factual inaccuracies, however, may require the establishment of an AI tool specifically designed to serve and safeguard schools.

"I think the likelihood is that for education, specifically, there will be a private AI cloud system," says Dr Rawnsley. "The underlying hardware – and perhaps the AI 'engine' itself – will be provided by a big tech company such as Google or Microsoft, in the same way that we now use Amazon to host websites. But the data going in and out of this AI will remain private, in its own safe corner."

Even if (or *when*) this educator-friendly AI comes online, K-12 teachers needn't worry that they've been rendered superfluous to requirements by technology. "The promise of AI is that it can be an extremely useful classroom assistant for teachers. But it's not going to do away with teachers, because somebody has to be responsible for information that gets put in front of students, and that's always going to be a human being – no matter where they got that information from."

It's likely that, in the future, AI won't just be used to generate content, but also to oversee access to that content. Dominic Broad, Director of Education, Thrive Education Partnership: "There are discussions taking place around the potential for an AI-powered 'exam station' that allows children with a range of needs – including children with autism or anxiety – to access traditional exams.

"When students with additional needs are placed into the traditional exam environment – a huge hall with rows of desks – it can sometimes be overwhelming. Okay, you could argue that it's 'fair'. But what we're ideally aiming for isn't fairness, but equity.

"With exam stations, students can take their exams entirely online, monitored by exam invigilators via video, remotely. Trials for these are going really well. But they pose the question: could AI be used to reduce the strain on the invigilators?"

AI is still in its infancy, and it's likely to be several years before we can accurately measure its impact on education. But if these early applications of AI offer any indication, that impact is likely to be nothing short of seismic.

"What if all the children of the world had an AI tutor? An AI tutor that could engage a student and really help them 'get' concepts. **If I'd had an AI tutor I would've been a better student: more engaged, more curious.** Because the fear of learning goes away."

Satya Nadella
CEO, Microsoft

The no-grades movement

Awarding an F to As, Bs and Cs

As UK educators rethink their pedagogical approaches in the face of shifting societal trends, the previously unheard-of idea of doing away with grading – in terms of schoolwork, exams, or both – is being earnestly discussed with increasing frequency.

In its 2022 report Ending the Big Squeeze on Skills: How to Futureproof Education in England, the Tony Blair Institute for Global Change (TBI) recommended that GCSEs and A-levels be scrapped in favour of a new system of assessment to better prepare school-leavers for the new world of tech- and AI-driven workplaces.

The TBI report suggests replacing the current exams system with a new qualification, involving multiple forms of continuous assessment between the ages of 16 and 18. The report asserts that the current, high-stakes-exam system relies too heavily on passive forms of learning, focused on direct instruction and memorising.

Writing in the Daily Telegraph, Sir Tony Blair stated: "It's time to scrap GCSEs and A-levels. These exams do far too little to meet the needs of the modern world, and employers are increasingly disgruntled by what they are seeing.

"While there is a place for these sorts of exams, we cannot rely on them alone: they only measure certain skills, they do not always do this accurately, and they invite narrow teaching styles aimed at passing tests rather than building other key aptitudes."

Rather than students being graded on their ability to retain and recite information in exam settings, there would be a greater emphasis on improving their capabilities across the 'four Cs': critical thinking, creativity, communication and collaborative problem-solving..

The TBI report posits that a new qualification for 18-year-olds could "draw on and refine the principles that underpin the International Baccalaureate". A series of low-stakes assessments for pupils at the end of secondary schooling, at age 16, would "help inform pupil choice and hold schools to account".

This would involve establishing an expert commission to reform the national curriculum to base it on minimum proficiencies for numeracy, literacy and science, and to eventually incorporate more digital skills. Responsibility for the design of the curriculum would transfer to a non-political and statutorily independent body; changing Ofsted's remit to focus on safeguarding and quality of school management; and creating student-owned learner IDs and digital profiles.

Many of Scotland's education thought-leaders have also expressed a desire to permanently move away from the current system, following the country's temporary halt on formal exams during the pandemic.

Published in June 2023, the Independent Review of Qualifications and Assessment (IRQA) was commissioned by the Scottish Government in 2021, to ascertain how well the current system is working.

Currently, Scottish students are required to sit graded exams when they enter the fourth, fifth and sixth year of secondary school. But the new review recommends radically changing the existing programme, so that pupils would no longer sit National Four and National Five tests. (Fifth and sixth-year students would still sit their Highers under the changes.)

The blueprint, produced by Professor Louise Hayward of the University of Glasgow, recommends that 15- and 16-year-olds work towards achieving a "Scottish diploma", to be graded on coursework as well as extracurricular activities such as the Scouts or Girl Guides, playing sports, or undertaking voluntary work.

The no-grades movement is also gaining some momentum across the Atlantic. In 2021, a much-discussed op-ed piece in the LA Times – 'End the grading system in K-12 schools' – openly called for an end to the current approach: "2,500 years ago in Ancient Greece, grades were never once used. Yet, it still spawned the greatest thinkers and writers of all time. Instead of applying grades, they used formative assessment to evaluate if a pupil understood the material being taught. But instead, the opposite is being done today. Most schools are vastly using summative assessment: the evaluation of student learning at the end of an instructional unit by comparing it against some standard or benchmark.

"The grading system is outdated and hasn't evolved since its first use, but why is that? Why haven't we strived for improvement or change?"

In both the US and the UK, then, opinion on the efficacy of the traditional grading system may be shifting. But while the concept of using formative assessment in schools is currently gaining new advocates, the concept itself dates back decades.

Esteemed educational psychologist Benjamin Bloom (1913–1999) first formally proposed the 'mastery learning' approach in 1968. Using Bloom's strategy, students must attain a level of mastery of a topic before moving forward to learn subsequent information. (A student's mastery of a topic could be confirmed by, for example, having them comfortably pass a knowledge test.)

Mastery learning centres on the idea that instruction should be finely tuned to the unique pace at which each student comprehends content. This stands in stark contrast to traditional, grades-driven teaching models, which often prioritise uniform time allocations and instructions, regardless of individual students' distinctive learning requirements and abilities.

This marks a significant shift, ascribing student learning challenges to instructional methods rather than their inherent abilities. Greater importance is placed on personalised teacher-student interactions over conventional group evaluations.

And in the post-pandemic world of schooling – where students' mental health is a heightened priority – a move towards mastery learning may alleviate the emotional pressures associated with letter grades. Student stress levels are reduced, and a more positive learning environment is fostered, emphasising growth over competition.

To see this no-grades approach in action, we can look to Finland's education system, rated "the best in the world" by the World Economic Forum. (You can read the WEF's reasoning in its 2018 thinkpiece, '10 reasons why Finland's education system is the best in the world'.)

"In Finland, they actually don't have any minimum mastery criteria," explains educational psychologist Dr Louah Sirri, "and there is no national exam. Their system is more focused on a kind of 'automatic promotion', with students moving up to a different classroom in an automatic way. And there is very early intervention to ensure that happens for each student. Homework is kept to an absolute minimum. Pressure is removed from students. It's the philosophy of 'test less, learn more'.

"They have a grading system for when students complete school, before they go on to higher education. But that's it, as far as grades are concerned."

For all the potential benefits of mirroring the Finnish system in UK schools, however, there are a number of caveats, says Dr Sirri. "In every Finnish classroom, you have three teachers: two focused on delivering the content, and one focused on supporting students who may be slightly behind, whether that be through learning difficulties or some other reason.

"The UK, however, has a teacher recruitment problem. That's not just a UK issue, however. Many countries are struggling with recruitment and resignations right now."

Tripling the number of UK teachers would require dramatic funding and policy changes that would be very difficult to swiftly achieve. "Finland only has 5.5 million people, so in terms of managing funding or making policy changes, that's far easier to manage than it would be in the UK."

There are critics who question whether doing away with grades in secondary schools would be worth the upheaval and expenditure. "As with anything, there are pros and cons," says Dr Sirri. "With grading systems, we know that students can tend to focus on simply learning by rote in order to pass exams and get higher grades, without ever being truly curious about the content they're learning. And we know that genuine curiosity does enhance learning.

"However, if you remove grades entirely, would that definitely have the desired effect? Perhaps it would be better to encourage students to face the stress and anxiety that grades might cause them, while also helping them understand that grades are not everything. To see that achieving the highest possible grade doesn't necessarily mean that you've genuinely mastered a subject."

Data-driven learning analytics

Deep-diving to find hidden educational insights

Data analytics are used across almost every sector. From retail to finance, hospitality to transportation, data is being collected, cross-referenced and mined for insights. These insights help organisations improve the efficiency and effectiveness of their operations, and predict future challenges or opportunities.

There are a number of ways data analytics can be put to use in UK schools. Firstly, analytics can be used to closely monitor students' performance, and identify those who are struggling to keep up. This proactive approach helps prevent students from falling behind, failing exams or dropping out, as educators can provide them with early intervention and extra support before they reach crisis point.

Analytics can also offer insights into student engagement, by tracking the time spent on course materials and interactions with multimedia resources. This data helps educators gauge the effectiveness of content, and the degree to which students are genuinely engaging with it.

Thirdly, teachers – recognising that each student has a unique learning pace – can use analytics to tailor lesson plans. By utilising data to understand individual learning patterns and weaknesses, educators can recommend additional resources and support to enhance comprehension.

Data can also be used to improve communication between schools and parents. By providing parents with clear, detailed insights into their child's academic progress, schools can foster a stronger partnership and improve the chances of student success.

On a more big-picture level, schools can optimise resource allocation based on data-driven insights. This includes decisions about staffing, budget allocation, and the deployment of educational technology to maximise the impact on student achievement. Data can also be used to identify areas where teachers may benefit from additional training or support. This ensures that educators have the necessary skills and resources to facilitate effective learning experiences.

Daniel Bryant – award-winning edtech consultant and a former educator – says the benefits of data analytics are particularly clear when placed in the context of teachers feeling overwhelmed by their workloads.

"Teachers can sometimes feel swamped. They may be teaching as many as 30 different students every lesson. That's 30 individuals they need to move forwards, educationally, during that time.

"The teacher will usually deploy a one-size-fits-all approach, in the hope that it connects with a large majority of the class. But unfortunately, this approach is not going to work for all of them, because some students will learn and process information in an incompatible way.

"Ideally, individualised learning is what they'd be aiming for, and that's what data analytics can help with."

Luke Knightly-Jones, education researcher (and sought-after private tutor), is similarly enthusiastic about the potential of data analytics. "By analysing the information we gather on students, we can adapt and streamline their lessons from week to week.

"This reduces the chance of any surprises, because we're no longer waiting until students take a high-stakes, summative exam to understand how they're doing in a subject. Issues will be flagged in good time, and educators and parents can exercise their agency to deal with them."

However, while data analytics allow teachers to better identify individual students' strengths and weaknesses, time constraints may make it difficult to act on those insights. Manually creating 30 variations of every exam, quiz or teaching asset simply isn't viable for most teachers.

But by combining data analytics with generative AI, such an individualised approach becomes more achievable. Data analytics learns what a student needs from teaching materials; generative AI responds by creating exactly those teaching materials.

Dr Rawnsley explains how this can work: "So, for example: I identify that one student requires graphical representation when completing a quiz. So I want to create a quiz for him that looks a little different from his classmate's, which in turn looks a little different from another classmate's.

"If I can create one version of this quiz, and then have AI adapt that quiz to the differing needs of these students, then that's hugely beneficial. I will need to vet the quizzes beforehand, but the AI has done the lion's share of the work for me, saving me a great deal of time. And now I have 30 quizzes perfectly tailored to the strengths of each student."

Department for Education

Case study

In 2016, the DfE asked the Independent Teacher Workload Review Group to investigate the collection and usage of data within England's schools.

In 2016, the DfE asked the Independent Teacher Workload Review Group to investigate the collection and usage of data within England's schools. The resulting report – 'Eliminating unnecessary workload associated with data management' – made the following observations and recommendations:

"When used well, data can have a profound and positive impact. It can help teachers to teach; school leaders to focus on the right issues; Ofsted to do its job; and the Government to understand how the education system is performing in England.

"Too often, however, the collection of data becomes an end in itself, divorced from the core purpose of improving outcomes for pupils, often just to 'be ready' in case data is needed. This increases the workload of teachers and school leaders for little discernible benefit.

"We have looked at how data is collected, entered, analysed, interpreted, and presented throughout the system, from the individual teacher in the classroom, through to the national data systems overseen by the Department for Education (DfE).

"We believe there are common overarching principles that should apply to all:

"a. Be streamlined: eliminate duplication – 'collect once, use many times'.

"b. Be ruthless: only collect what is needed to support outcomes for children. Theamount of data collected should be proportionate to its usefulness. Always ask why the data is needed.

"c. Be prepared to stop activity: do not assume that collection or analysis must continue just because it always has.

"d. Be aware of workload issues: consider not just how long it will take, but whether that time could be better spent on other tasks."

STEM/STEAM labs

Getting hands-on to build formative experiences

Evolving from the 'maker movement' of the early 2000s, maker learning is a dynamic educational approach that places students at the center of their learning experience, transforming them from passive recipients of information into active creators and problem solvers. Hands-on, experiential learning is encouraged through the creation of tangible projects, often within a dedicated learning area known either as a makerspace, or a STEM lab – with STEM standing for Science, Technology, Engineering and Mathematics. (A STEM lab is essentially the same, but minus the Arts component.)

Student-centered exploration is a key component of makerspaces and maker learning. The focus is shifted away from prescribed curriculum and towards student-driven inquiry. This empowers students to explore their interests, passions, and curiosities, leading to a deeper, more engaged learning process.

STEM labs will often host combinations of technologies, tools, and materials, with students coming together to design, build, and iterate on their physical and digital creations. Maker learning transcends traditional subject boundaries: it encourages students to draw from various disciplines, integrating science, technology, engineering, arts and mathematics to solve complex, real-world problems.

A maker-learning project might involve robotics, coding or even chemistry alongside traditional trade skills such as carpentry or metalwork. Through this cross-pollination of abilities, tools and interests, maker learning celebrates diversity and inclusivity. It accommodates different learning styles and backgrounds, making projects widely accessible. Students learn essential 21st-century skills, including creativity, adaptability, critical thinking, communication, collaboration and digital literacy.

When overseeing maker-learning projects, the teacher's role is that of facilitator, rather than lecturer. The teacher guides and supports their students, fostering a culture of curiosity and exploration, while ensuring safety, providing insights, and encouraging class-wide collaboration.

"With maker learning and STEAM labs, the idea is essentially: let's stop talking about theory and get into the practice," says edtech consultant, and former educator, Daniel Bryant of Collaborative Realities. "We know that actually doing something helps students engage with and retain information, because it's experiential learning."

Setting up a fully equipped STEAM lab requires significant investment. As such, many of the UK's most notable STEAM spaces have, so far, been paid for by the private sector: Network Rail, Everton FC, Dyson and biotech giant Vertex have all funded STEAM labs designed for school-age students since 2020.

Maker learning needn't be dependent on cutting-edge technology and dedicated facilities, however. Simon Luxford-Moore is head of eLearning at the ESMS family of independent schools in Edinburgh. "Some of our [primary-age] children came together to create a new den for the school. They were required to plan out the project by working backwards. They not only had to design the den, they also needed to establish the resources they needed, and where they were going to get money for those resources.

"We get the children involved in these practical projects as much as possible. They recently designed their own playground, for example: they chose the paints that would be used, and decided on a giant snakes-and-ladders game as part of the design."

Further reading

Makerspaces in Education by Caroline Keep (TES New Teacher of the Year 2018), Penketh High School, Warrington

Published by the Independent Schools Council, 2020

Post-pandemic expansion of SEL

Prioritising students' mental wellbeing

The global pandemic profoundly impacted the educational landscape, prompting UK schools to prioritise and expand their Social and Emotional Learning (SEL) lessons.

The reasons for schools' newly energised focus on SEL are manifold. First and foremost is the fact that the pandemic greatly exacerbated mental health issues – including anxiety, stress, and isolation – among students. According to a 2023 report by the Institute for Fiscal Studies, half of all children in England suffered a setback to their emotional and social development during the first year of the pandemic.

Children from all economic backgrounds were affected, although those aged four to seven were the most likely to have suffered a deterioration in their skills (52%). Children aged eight to 11 were the second-most affected group (48%); while 42% of children aged 12 to 15 were negatively affected.

Children whose parents' employment changed as a result of the pandemic, including those who were furloughed, were more likely to see their social and emotional skills worsen.

Expanded SEL programs help address these challenges by providing students with the emotional tools and coping strategies they need to navigate difficult times.

SEL equips students with resilience skills, helping them bounce back from setbacks and adapt to changing circumstances. The importance of these skills came into sharp focus during the pandemic, as students faced disruptions to their learning routines and daily lives.

The pandemic also gave rise to prolonged periods of remote, isolated learning, which impacted students' social skills and emotional wellbeing. Expanded SEL programs aid the social reintegration process by fostering healthy relationships and stronger social connections. SEL also promotes equity by addressing the unique needs of diverse student populations, creating more inclusive learning environments.

Educational psychologist Dr Louah Sirri says that, as with every shift in educational policy, there's a careful balance to be struck: a need to ensure that expanded SEL programs don't over-protect students from the natural stresses and strains of life.

"It's definitely good to teach young people how to regulate their emotions and develop their social skills," she says. "But it's also important to challenge them. I'm not suggesting we traumatise them, obviously! But the more we focus on protecting their social and emotional wellbeing, we're spending less time helping them directly face up to some of their challenges.

"For me, education and life go hand-in-hand. So if you're unable to face some of the challenges that arise during your educational journey, you will lose some of these abilities outside the education system, too.

"We need to give young people the foundation for emotional self-regulation and social skills. Then you want them to keep building on top of that foundation on their own. But what sometimes happens now is that we provide them with the foundation, but then we also hold their hands while they're building on top of it. And so we lose the social cognitive skills that you'd otherwise expect them to develop independently.

"If you give a child the right environment from the beginning, and you teach them how to self regulate, to be aware of others, to communicate with others, if you give them those basics, they should be able to carry on developing these skills on their own."

SEL isn't solely being used to tackle social and emotional issues that came to the fore during the pandemic. Advocates say that SEL not only improves students' wellbeing, but also enhances academic performance. Schools are increasingly drawing a link between students' mental-health needs and optimized learning outcomes.

Edtech company Branching Minds' Cumulative Impact Report 2022 revealed a significant positive correlation between students' social-emotional skills and their reading and math performance.

The study conducted an analysis of data from nearly 4,000 US students (aged 13 or 14) during the 2021–22 school year, utilising screening assessments for social-emotional skills (DESSA-Mini) and measuring reading and maths performance.

The research found that students with strong SEL skills tend to achieve higher levels of proficiency in reading and math, whereas those with weaker SEL skills often exhibit lower academic performance.

The data revealed a substantial overlap between students in need of additional SEL support and those requiring extra academic assistance. Approximately 65 percent of students identified as needing more support in their SEL development were also identified as requiring supplementary academic support.

These findings underscore the interconnectedness of SEL and academic outcomes, highlighting the importance of addressing both for holistic student development.

VR and AR

Engaging students with 'impossible' experiences

It was 1990s movies such as 'The Lawnmower Man' and 'The Matrix' that first introduced the concept of virtual reality to mainstream audiences. The technology itself, however, was to remain inaccessible to the public until the mid-2010s, when Oculus and Galaxy Gear headsets first hit shelves. Although aimed squarely at gamers, this first wave of mass-market VR technologies opened up an exciting new avenue for technology in the classroom.

It was Google's education-focused Expeditions app – launched September 2015 – that initially seemed destined to introduce VR to schools, en masse. Polished and educationally sound, Expeditions content was accessed using Google Cardboard – inexpensive cardboard or plastic headsets that held compatible mobile devices.

Expeditions was, however, to be discontinued by Google in 2021. For all its admirable ambition, the platform proved incompatible with users' real-world needs. The app's phone-screen interface could be awkward to use; a classroom's worth of headsets could not be managed centrally and simultaneously; and each headset required a smartphone, which were inappropriate and potentially unsafe devices for classroom use.

Furthermore, Expeditions content – while well-made – was somewhat limited in scope, and didn't cover every aspect of the curriculum. It didn't harness the evocative interactivity of AR, and teachers were unable to upload their own self-made content to the platform. Google Expeditions, then, was a case of 'right concept, wrong execution'.

Launched in 2020, Meta's Quest 2 initially seemed destined to succeed where Google had fallen short. Unfortunately, the headset – and the surrounding Metaverse concept – remains too squarely aimed at gamers and social-media users to be of practical use to educators. Without an easy way to manage access, control content, or create accounts without sharing personal data, Meta's impact on UK schools has been limited. In terms of classroom management and student safeguarding, the Quest 2 simply can't deliver the essentials.

Elsewhere, the launch of Apple's Vision Pro – set for early 2024 – will certainly help to elevate VR's place in the public consciousness, thereby bolstering acceptance of VR as a key element of modern schooling. But with Apple's marketing and retail pricing (expected to be around £2,850) currently positioning the Vision Pro as aspirational tech for 'early adopter' types, the system's appeal as a mass-market educational tool appears limited.

In the meantime, ClassVR has emerged as the global frontrunner in educational VR and AR. Affordable, adaptable and easy to use, ClassVR headsets are now deployed in more than 200,000 classrooms worldwide. The VR edtech revolution, so nearly delivered by Meta and Google, is now truly underway.

Dr Rupert Rawnsley is one of the principal architects of the technology underpinning ClassVR. "The principal benefit that we see with students is around engagement," he says. "Utilising ClassVR headsets allows teachers to pierce through students' apathy, or their reticence to engage with a certain topic. There's an instant and powerful emotional response to the content, and that leads to measurably improved learning outcomes.

"Today's students have grown up with YouTube, with TikTok, and so traditional presentation methods or videos don't really make a huge dent in terms of getting their attention and imparting information. But with ClassVR content, they're exploring and engaging with this 3D world. And that's very stimulating and very impactful, educationally."

One of the key reasons for ClassVR's success is the fact that every element of it was designed, from the ground up, with education in mind. Devised by teachers for teachers, ClassVR is purpose-built to engender positive learning outcomes in busy classroom environments. ClassVR technicians set up and configure the headsets for teachers, and an educational-support team provides guidance on usage.

ClassVR provides educators with curriculum-aligned content; ease of implementation, storage and charging; and total control over students' VR experiences, via the ClassVR portal. The latter point is of particular importance, as it means students stay on-track and undistracted throughout their VR experiences.

These are experiences that would otherwise be unattainable, whether for practical or financial reasons. Choosing from thousands of instantly accessible content options, teachers can bolster their lessons with intensely engaging VR and AR experiences: walking with dinosaurs, flying across Saturn's rings, experiencing an earthquake, stepping into Florence Nightingale's shoes – the possibilities are expansive, and ever-growing. Through immersive visualization, students can swiftly grasp even the most complex, alien or abstract of topics.

With students firmly focused on the subject at hand, and the teacher steering the experience throughout, a ClassVR headset session may only last a handful of minutes. But this rapid immersion into a topic helps the teacher to get to the heart of their lesson plan, faster.

"Think about when students are first coming back into class after recess," says Dr Rawnsley. "We all remember what that was like: you're still in that 'lunch mode', talking with friends, not really focusing for those first 10 minutes. But if the teacher starts off the lesson with some VR content, then once that headset is on, the students' peers are no longer a distraction to them. They're experiencing exactly what the teacher wants them to experience. And in five minutes, when the headsets come off, then the students are enthused, they're excited, they're on-message. And the teacher can segue into the pedagogy they have planned. So, it's certainly not intended to replace existing lesson plans. ClassVR is supplemental. But it's high-impact supplemental."

The bank of research into the effectiveness of VR as an edtech tool is growing all the time. In 'Effects of virtual reality on learning outcomes: A meta-analysis' – published in Educational Research Review, 2022 – 21 standalone scientific-journal papers on educational VR were analysed to identify common findings.

The paper concluded that, "Virtual reality has a medium-to-large positive effect on students' learning gains," and, "Immersive virtual reality promotes larger gains than semi- and non-immersive systems."

And in its **'What does virtual reality and the metaverse mean for training?'** report, PwC – a leader in the world of professional services – found that learners using VR were four times more focused than those consuming other electronic content; were 3.75 times more emotionally connected to lessons than purely-classroom learners; retained the necessary knowledge four times faster; and were 275% more confident in applying what they'd learned through VR.

Beyond bringing subjects to life, VR is also increasingly being used in the context of students' emotional wellbeing. "We've been using ClassVR headsets for six years, to support and enhance learning," says Simon Luxford-Moore, head of eLearning at the ESMS family of independent schools in Edinburgh. "But in the last year, we've realised we can offer more than curricular content through VR. We're now using headsets to support children with regards to anxiety, autism and aspects of ADHD.

"When they need a timeout, we have QR codes that a child can quickly and easily scan using the headset, and it will bring up their bespoke playlist of content that helps them cope with big emotions.

"The results are phenomenal. Now, instead of these children requiring an average time of 20 to 40 minutes before they could overcome dysregulation, find a quiet place, calm down, and eventually return to class, they're now able to reach that point through using VR within just five minutes."

ClassVR also enables educators to create and upload their own content: panoramic photographs taken during class field-trips, for example, or 3D models designed by children in CAD software. This content can then be shared with other educators, via a huge global repository of independently-produced assets, curated, managed and supported by the ClassVR team.

This content-sharing capability has given rise to a global community of ClassVR-using enthusiasts, eager to help and inspire others with engaging new ways to harness the technology. And with ClassVR gaining hundreds of new converts every day – thanks to its accessibility, adaptability and educational prowess – that thriving community is growing stronger all the time.

The power of VR learning

Compared to learners taught with more traditional teaching methods, VR learners are:

x4 more focused

x3.75 more emotionally connected to lessons

x4 quicker to retain knowledge

275% more confident in applying learnings

Source: PwC

Case study

ClassVR use at Southborough CE Primary School

Neve Hinton is Discovery Centre Coordinator at Southborough CE Primary School in Tunbridge Wells.

"Technology is very much the centre of our school," says Hinton. "We use technology to enrich and augment what we're learning in our classrooms, and it all happens in our Discovery Centre, the beating heart of our school.

"Students come into the Discovery Centre once a week in a timetabled slot. They spend their time discovering and investigating, using technology such as ClassVR to enhance what they've been learning in our classrooms. It pushes everything else forward."

"The children use ClassVR every week, and they absolutely love it. It's been a very exciting journey. One way we use it is to enrich reading and writing. For example, we recently had classes using VR while children were doing writing activities on winter forests. It helped inspire imaginations as some of the class hadn't ever experienced a winter forest before, but then they could in VR!

"We've had children build their own VR experiences based on books they're reading. They literally build the VR experience in a physical space! They get a cardboard box and decorate it in line with the book. Then we use a 360-camera to capture it, upload it to ClassVR, and they share it with the other students in VR. The rest of the class can then make predictions on what they think the book is about.

"The children are really engaged with it. They really enjoyed linking the virtual to the physical."

"When we first began using VR, we had a group of disadvantaged children reading a book called 'Gorilla Dawn' which is all about mining in a rainforest. We had them exploring a VR experience of the rangers in the particular rainforest area where the book is set. For children who would never have the opportunity to visit or experience that first-hand, the experience really brought the book into reality. They could actually begin to picture what the book was describing."

"ClassVR has offered our pupils the opportunity to discover the world outside of Southborough. From experiencing the nightly fire puja in Varanasi to gaining insight into the lives of refugees in Athens, the VR experiences serve as a gateway to empathy and understanding."

Read the full case study

Case study

ClassVR use at Katherine Warington School

"When the school first started with VR, it was all about helping students engage in lessons through a new way of learning," says Danny Cain, IT Technician at Katherine Warington School (ages 11–16), Harpenden. "We wanted something that was completely different from a YouTube video or an image in a PowerPoint presentation.

"The amount of engagement we've had with ClassVR has just been absolutely amazing. Seeing students experiencing VR and hearing their reactions, it's an amazing feeling. You know they're going to be excited for the lesson. They're going to get involved, they're going to be engaged. It's had such a good impact!

As the schools' IT Technician, Danny typically supports teachers while they use ClassVR in lessons. This helps staff build confidence with the technology while also encouraging them to integrate virtual reality into more of their teaching.

"I normally come into the lesson with the VR headsets, just to make sure everything goes smoothly and to give teachers that confidence. By managing it for them and supporting them in the lesson, it makes them more comfortable, and results in them booking ClassVR out more. So now we're working with teachers, encouraging them to use the headsets and showing them all the features of ClassVR. When I'm showing them the resources and all the community playlists we can access, they just go, 'Wow!'

"I've also spoken to teachers about ClassVR's impact on revision. At the end of a topic, some teachers will plan a VR lesson to recap everything students have learned. After using ClassVR for this, they're seeing big changes in grades and engagement in core subjects. Students remember more of the topic because they're more engaged. It's an amazing resource and a really helpful tool for learning."

Read the full case study

Further reading

50 Creative Ways to Use ClassVR

Conclusion

A bright, bold future

"Many people view the pandemic as having been disastrous for education, but I view it as a phoenix-from-the-flames moment," says Simon Luxford-Moore, head of eLearning at Edinburgh's ESMS family of independent schools. "Yes, there was a lot of disruption, but I think we've come out of it all the better. I know our schools have taken a great many lessons from it. It's forced us to look, creatively, at what we can provide students. And so I view the current moment as an amazing opportunity."

If the enforced 'hard reset' of the pandemic has created an opportunity for radical change, then the 2020s' dramatic technological and societal shifts – the rapid evolution of AI; the increased focus on mental wellbeing – has made that change feel essential.

As we've seen from the research and expert viewpoints outlined in this whitepaper, there exists real momentum for a once-in-a-generation evolution of UK schooling. There's a hunger for bold, exciting new thinking among frontline teachers and policy-makers alike. This newfound willingness to rethink and rebuild looks set to make the 2020s a defining decade for education.

"As leaders in schools, what we need to do right now is invest in technology," says Dominic Broad, Director of Education at the Thrive Education Partnership. "That's what we did in the school I was deputy headteacher of in Wales: invested our funding in the things we knew would have a major impact. In technologies, in infrastructure, in IT. Because that's the world children live in now, and that's the world they're going to occupy in the future."

(Worth noting: following its investments in technology and infrastructure, the school in question was upgraded to 'Excellent' by Estyn.)

There's little doubt that some of the emerging approaches covered in this whitepaper are destined to be adopted more rapidly and readily than others. Few forward-thinking educators would question the importance of SEL, the potency of VR, or the inherent value of STEAM labs. Other methodologies, however, are more divisive: the blanket adoption of flipped learning, for example, seems unlikely to happen on a grand scale in the near future.

At the heart of all these evolutions in learning, of course, are the students. How will they look back at their 2020s school years, decades from now? Which current methodologies and technologies will they recall fondly – and which will they shudder at the very mention of? We can make educated guesses, of course, but only time will truly tell.

Want to see ClassVR in action?

Click here to book a free, no-obligation, demo.