How can AI support teachers and learners?

How will AI impact the role of the teacher?

How are schools using AI tools?

What does the future hold?

Impact

JOURNAL OF THE CHARTERED COLLEGE OF TEACHING

SPECIAL ISSUE | 2025

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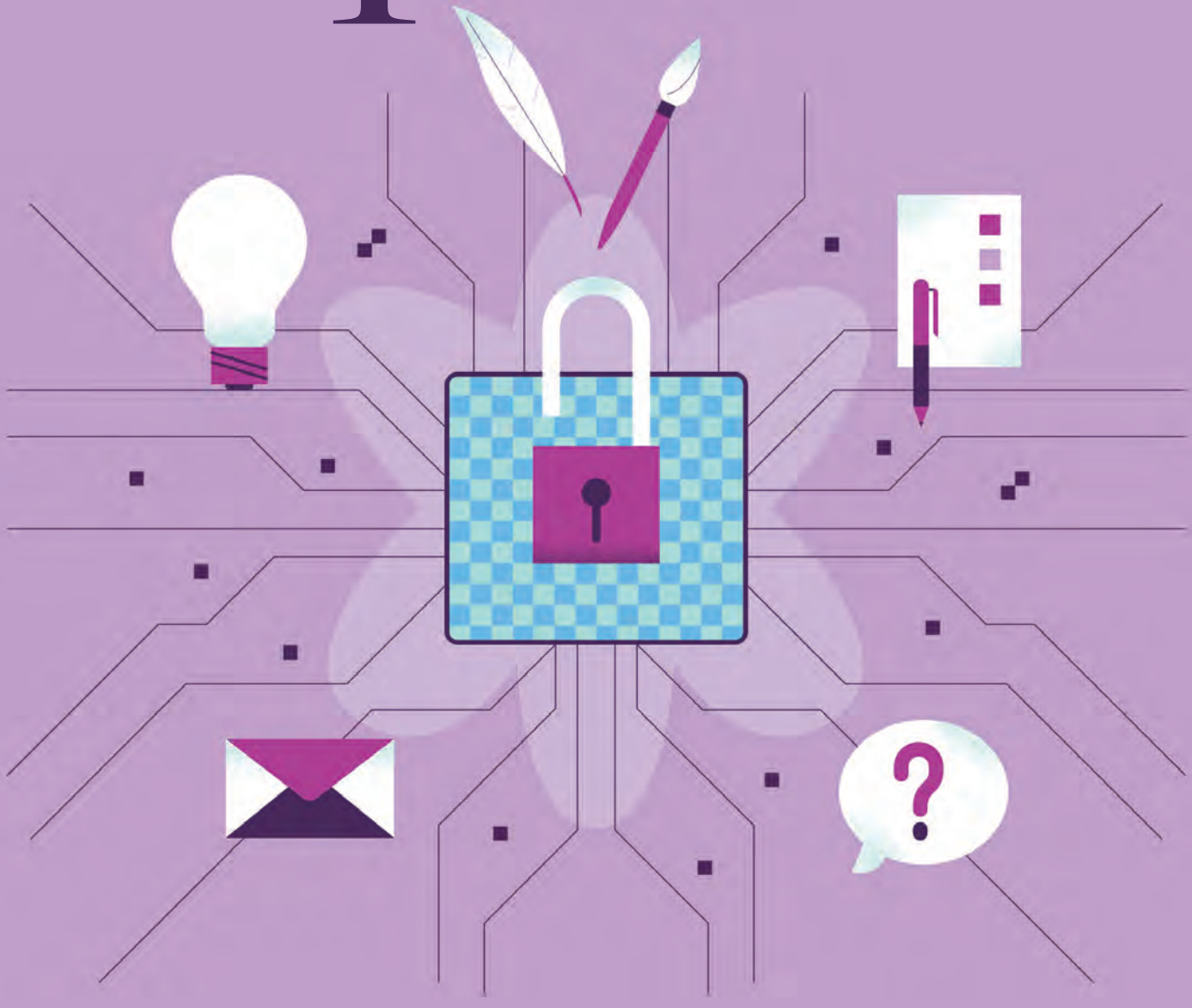

Safe and effective use of AI in education

Chartered College of Teaching

Issue supported by

Department for Education

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From the editor

In Spring 2019, the Chartered College of Teaching published a special issue of *Impact* focusing on EdTech, funded by the Department for Education (DfE). In the six years since then, EdTech use in schools has changed almost beyond recognition: first, due to the COVID-19 lockdown requiring teachers to move rapidly to online and blended learning models, and the resultant changing expectations from pupils and parents; and more recently, owing to the advances in generative artificial intelligence (GenAI) technology, and its widespread availability to the general public.

While many schools were already using online tools and, in some cases, remote lessons before the COVID-19 pandemic, AI was not even mentioned in that 2019 issue of *Impact*. Although AI technology was of course already being used in various ways within the EdTech tools used by schools, as well as to power chatbots and other widely available technologies used by the public, it was the launch ›

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of ChatGPT in November 2022 that really marked the beginning of GenAI's significant impact in schools, colleges and other education settings.

The rise of GenAI offers exciting opportunities and applications for education – but it also comes with significant risks. While the technology itself is perhaps very different from tech tools used in education previously, in many ways the promises are not so different from those that were considered back in that 2019 issue of *Impact:* potential for workload reduction and widened professional development approaches for teachers; increased engagement for students; novel approaches to assessment; opportunities for independent student learning and practice; and the development of new skills for the careers of the future.

The risks, too, are not unfamiliar: concerns around ethics; academic integrity; a loss of the human and relational aspects of education; implications for cognitive development; and, as Neil Selwyn reminded us in his editorial for the 2019 issue, the risk of the Matthew effect – the phenomenon whereby those who already have an advantage accumulate more advantages through access to novel technologies, and those with disadvantages become even more disadvantaged, across the gulf of the 'digital divide'.

Widespread AI use has profound implications across early years settings, schools, colleges and other education providers. A particular risk lies in the very 'newness' of GenAI technologies, particularly considering the scale of their current use. The research into their effects, including over the medium and long term, is very limited, and we need to act with caution. This is why many of the articles in this special issue of *Impact* are so tentative in their conclusions; we can't yet claim with any certainty how AI is affecting and will affect teaching and learning, and teachers and learners, going forward.

But I believe it is incredibly important to share and reflect on research and practice around AI in education, drawing on what we do know, considering potentially useful applications and reflecting on the challenges and risks of which we need to be aware. For me, three major themes emerge from the articles in this special PDF issue.

The first is that safety, ethics and privacy issues must be at the heart of our decisions around AI use. The DfE has published a framework for AI product safety expectations in education, setting out detailed safety standards and technical safeguards to protect students. It has also commissioned Chiltern Learning Trust and the Chartered College of Teaching to develop training materials on the safe and effective use of AI, due to be published later this year, with the opportunity for teachers to gain certification through the Chartered College of Teaching. Through this training and accreditation, teachers will be able to build and demonstrate their understanding and ongoing development of the tools and policies required to ensure that students and staff alike are kept safe while embracing the exciting new technologies available.

And we must, of course, ensure that we are following the latest guidelines and legal

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The sheer importance of awareness for educators of the potential challenges and concerns raised by widespread AI use is why we have, for the first time ever, produced a PDF issue of *Impact* that can be shared with all educators

requirements for use of AI tools, and that they are adopted within the framework of our schools' broader technology and safeguarding policies, ensuring that any implementation aligns with ethical guidelines and any age limitations on use.

A new AI content store, jointly funded by the DfE and the Department of Science, Innovation and Technology, will also pool curriculum guidance, lesson plans and anonymised pupil work, so that AI companies can train their tools using high-quality input in order to generate effective and useful content for teachers and pupils. It is crucial that we consider not only the content that we use, but also the values and ethics that underpin its development.

The second theme is that we must continue to look for and generate evidence about the impact of AI technologies in education, both positive and negative. The DfE is commissioning work in this space too, including work around the effective use of assistive technology for pupils with special educational needs and disabilities, funding for the development and evaluation of new tools, and a pilot of an EdTech Evidence Board run by the Chartered College of Teaching. This will involve ›

developing criteria that is based on the best available evidence and consulting with the profession so that EdTech providers can be encouraged to conduct robust research and evaluation, and teachers and leaders can be confident that they are choosing the right tools for their contexts and needs.

The third and final theme is that we must consider AI tools' role in the context of conversations around teacher professionalism, recruitment and retention. As articles in this issue demonstrate, it appears that there are opportunities for teacher workload to be reduced through effective use of AI technologies to support lesson planning and assessment. But this requires up-front time for teachers to develop their skills and knowledge. There are also murmurings about whether these technologies might have the capacity to replace the human teacher in the classroom. Yet it is clear to me that at the heart of teaching is the deeply human relationship – the connection between teacher and student – and that highly effective teaching depends on the knowledge and skills of expert practitioners. This will not, and should not, change with the advent of GenAI.

The examples shared in this special issue won't necessarily be those that you consider appropriate for your setting, and neither are they examples of perfect practice. Where authors mention specific AI tools, this is for context only and does not imply endorsement or recommendation of any particular tool. You will need to make decisions based on the your pupils' needs and your own consideration of the technologies available. I hope, however, that these articles inspire thinking, conversations and action. The sheer importance of awareness for educators of the potential challenges and concerns raised by widespread AI use is why we have, for the first time ever, produced a PDF issue of *Impact* that can be shared with all educators. We have also published a wider selection of articles in the open access online edition of this special issue, available on the Chartered College of Teaching's platform, MyCollege. In our future content, we will continue to seek out new research and reflections on this topic so that we can maintain our awareness and progress our knowledge as a profession. I look forward to continuing the conversation.

Impact JOURNAL OF THE CHARTERED COLLEGE OF TEACHING

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Designed and published by Redactive Media Group
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Website: www.redactive.co.uk

MIX Paper | Supporting responsible forestry FSC® C008161

EDITORIAL
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Sub-editor: Kate Bennett

PRODUCTION
Production manager: Aysha Miah-Edwards

PRINTING
The Manson Group

ANNUAL PRINT SUBSCRIPTION
Published termly
ISSN: 2514-6955
UK charity number: 313608

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Using GenAI: What do teachers really need to know?

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My first experience of using AI almost crept up on me. I was aware of some of the AI tools available, particularly ChatGPT, but had yet to try them out. Yet one morning, as I was preparing a spelling activity for a group of children, I realised that instead of spending the next 10 minutes writing a short paragraph that contained words from the spelling pattern that we were learning, I could generate the text using AI.

I am not alone. A recent study published by the Education Endowment Foundation (EFF) (Roy et al., 2024) found that in November 2023, 42 per cent of teachers reported using AI tools to help with schoolwork. In fact, the number of teachers using AI increased from 35 per cent of teachers in August 2023 (Fletcher-Wood, 2023) to 57 per cent in August 2024 (Hallahan, 2024). Given the success of my own early attempts at using generative AI (GenAI), I am interested in investigating how AI tools can support the work of teachers in planning and preparing lessons.

A Department for Education policy paper on GenAI in education (DfE, 2023) suggests that AI tools could reduce workload across the sector, freeing up teachers' time and allowing them to focus on teaching. Indeed, the trial commissioned by the EFF (Roy et al., 2024) sought to examine the effect on teacher workload of using ChatGPT for lesson and resource preparation (LRP), in comparison to planning lessons without GenAI. They concluded that the teachers who used ChatGPT for LRP saved an average of 25.3 minutes per week (Roy et al., 2024). However, the proportion of lessons planned using ChatGPT was significantly lower in weeks six to 10 than in weeks one to five, suggesting that the use of ChatGPT declined over the trial period. According to the data, the proportion of lessons planned using ChatGPT decreased from 39 per cent to 29 per cent across the two blocks. So, I'm curious: if using GenAI saved teachers time, why did its use decline (Roy et al., 2024)?

This prompted me to think about the challenges that might face teachers using ChatGPT in LRP. As a researcher in teacher learning, I am keen to understand how teachers engage with AI tools and embed them into their practice, but what does that mean beyond knowing about GenAI and the tools themselves? What do I need to know as a teacher in order to engage productively and effectively with ChatGPT in my LRP?

My observations have emerged from interrogating my own teaching practice, as I engaged with the use of ChatGPT in LRP for my own class. Studying how teachers work has prompted a widespread interest in teacher identity (Beijaard et al., 2004) and I have reflected on my own experiences by considering three

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different aspects of a teacher's identity. It is acknowledged that differences in stance can affect teachers' pedagogical reasoning (Horn and Kane, 2015), which may, in turn, shape how they use GenAI tools in their classroom practice.

Drawing on research (Beijaard et al., 2000; Akkerman and Meijer, 2011; Horn and Kane, 2015; Vermunt et al., 2023), these three representations are: (a) the subject matter perspective, which is where teachers focus on the propositional knowledge of the subject that they are teaching; (b) the student development perspective, where teachers prioritise understanding and supporting students' learning; and (c) the teaching perspective, which centres on the understanding and application of different teaching methods. Akkerman and Meijer (2011) describe how the multiplicity of perspectives is important to how teachers view their professional work, and it seems an appropriate place at which to start exploring the knowledge and understanding employed by teachers when using GenAI tools.

A subject matter perspective

As I adopted a planning-as-pacing approach (Horn and Kane, 2015), knowledge of the subject – or, more specifically, knowledge of the topic that I was teaching – was the starting point. Drawing on curriculum documentation, the learning was framed by expectations of what the children needed to know by the end of the unit of work, and organised into a meaningful sequence. This framework informed my ChatGPT prompts.

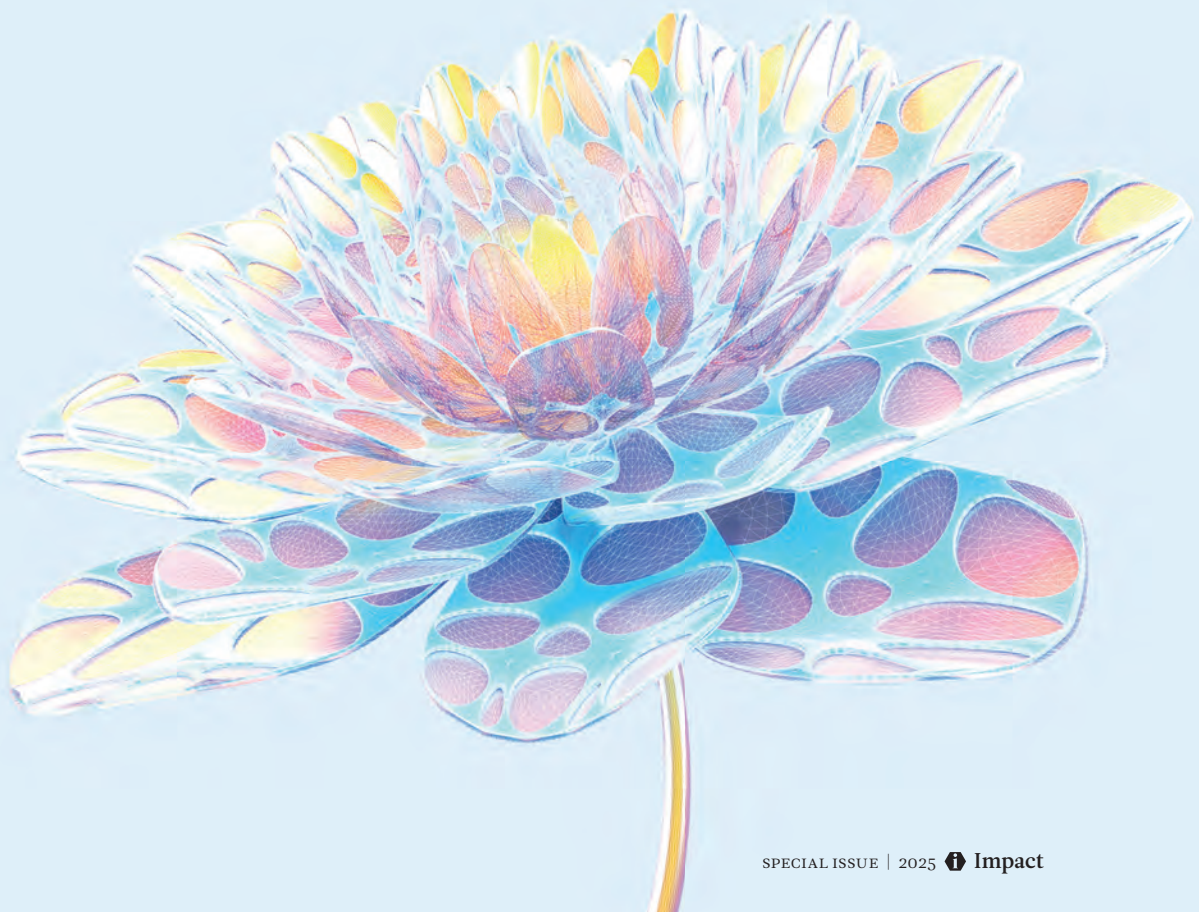
Differences in stance can affect teachers' pedagogical reasoning

Sifting and discarding

The amount of information generated from my requests for explanations of scientific concepts and misconceptions was extensive and required refinement. For example, the prompt 'I am teaching my Year 5 class about friction. What are the common misconceptions about friction?' returned eight separate misconceptions – far too many to cover in a session that focused on revisiting learning from previous years. I had sought to expand my subject knowledge, but ended up needing to use my existing subject knowledge to sift through the points provided and discard those that were not relevant to the session that I was teaching.

Fact-checking

While all the information provided was related to the topic, some suggestions referenced scientific concepts that had ›



not yet been introduced to children in Year 5. For example, the prompt 'Give me five quiz questions for my Year 5 class on friction and gravity' generated questions in a range of different formats; however, some referenced concepts to which the children had not been introduced. It was clear that I needed to have a good understanding of what a child in Year 5 needed to know in order to check the appropriateness of the questions being presented.

A teaching perspective

Once I had selected the content, I turned my focus to the conception of learning activities that would help my students build their knowledge and understanding of the topic. I perceived this as an opportunity to use ChatGPT to provide activity ideas for my lesson on gravity. Using the prompt 'I am teaching my Year 5 students about gravity. What are some activity ideas related to gravity?', I was given a list of 10 different ideas that would demonstrate the concept of gravity to my students. Again, this required sifting and discarding, but now thinking about the optimal organisation of teaching actions into a lesson (Krepf and König, 2022).

Structuring

Research suggests that when planning a lesson, teachers must anticipate the organisational process of teaching, which includes the organisation of the content into phases and sections so that the pace of learning meets students' needs (Muijs and Reynolds, 2011). These phases or sections must be connected in turn to maintain the flow of the lesson (Krepf and König, 2022). Consequently, in my own practice, I needed to review the activity idea that I had selected and identify how it fitted within the structure of the lesson that I conceived, organising it into actions that could be enacted either by myself or by the students.

Visualising

Anticipating the organisational process of teaching includes a process of mental simulation, where an idea or activity is 'rehearsed' in preparation for teaching (Dudley, 2013). In this case, I took the idea generated by ChatGPT and imagined it taking place in my classroom. Using visualisation (Mutton et al., 2011), I was able to see these actions taking place in my mind's eye, envisaging questions that I might need to ask, predicting children's responses and establishing expected behaviours. This ensured that the lesson was not only coherent but also appropriately pitched for my students.

A student development perspective

This perspective conceives of planning as building from students' current understanding (Horn and Kane, 2015). While this was not an approach that I adopted at the beginning, during the course of my lesson and resources preparation, I needed to start matching the ideas and activities that I had developed through ChatGPT to the needs of the children in the class. For this, I needed to draw on the detailed knowledge of my students that I had gathered over time from classroom practice. Without this knowledge, it would have been difficult to anticipate the ways in which what was planned would unfold in the classroom (Mutton et al., 2011).

Hypothesising

In one of my lessons, I was proposing to investigate the concept of water resistance, and prompted ChatGPT to provide me with an explanation of this scientific concept. When presented with this explanation, my first response was to revisit the prompt, as I hypothesised that many of the class would require additional scaffolding to understand the major points. An edited prompt was used but, again, the explanation made some basic assumptions about the children's understanding, and I predicted that some individuals would need additional information to make sense of this concept.

Scaffolding

This led to my next prompt, as I was keen to include some images that would scaffold the children's understanding of water resistance – in this instance, focusing on the difference between objects that were streamlined and not streamlined. Although the images were relevant, they were quite complex representations and might have led to further misconceptions. As a result, I used other sources to supplement and support the children's learning in the lesson. For a primary practitioner, this is perhaps not surprising, as we are often seeking to demonstrate abstract concepts in concrete and pictorial ways, which at present appears to be beyond the capability of ChatGPT (Roy et al., 2024).

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Conclusion

I started by asking: 'What do I need to know as a teacher to engage productively and effectively with ChatGPT in my lesson and resource preparation?' I can see that all aspects of professional identity have been employed when engaging with GenAI tools for LRP. Indeed, the planning process has brought these threads together, revealing their interactions in the deliberation that followed from the ChatGPT prompts. The decisions that I made were framed by judgments about what needed to be done for the good of my students – the domain of practical wisdom or 'phronesis' (Biesta, 2015). So, when considering teacher engagement with GenAI, the focus should not just be on developing tools and techniques, but also on investigating the meta-cognitive processes that facilitate their use in the intense, complex reality of classroom life.

While I am still at the start of my journey of exploration, I have identified practices to which I will be returning. For example, the vocabulary list that ChatGPT provided to share with my students at the beginning of the unit of work was a 'game-changer'. It did save me time, but there are also times when it is simpler and quicker to use pre-prepared or published resources to support LRP. I am thus reminded of a quotation from McIntyre (2000, p. 10): 'good teaching is not simply a matter of learning the appropriate ways to act in order to get things done. It is at least equally a matter of learning how to decide what to do.' As I reflect on the successes and failures of the last few months, I am reminded that a tool is only ever as good as the craftsperson using it.

The decisions that I made were framed by judgments about what needed to be done for the good of my students

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Teachers' use of ChatGPT in lesson preparation can save time

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Introduction

Since the release of various generative AI (GenAI) models for public use, there has been great interest in its potential use in education. By August last year, 57 per cent of teachers reported using at least one form of AI tool to help them with school work, according to Teacher Tapp (Hallahan, 2024).

In December 2023, the National Foundation for Educational Research was commissioned by the Education Endowment Foundation and the Hg Foundation to conduct a randomised controlled trial of the use of ChatGPT by teachers when preparing for lessons (Roy et al., 2024).

Our aim was to provide useful evidence for the education sector on the effect of using ChatGPT on teacher workload, which we know is a particular challenge for the teaching profession compared to other similar graduates (McLean et al., 2024), with implications for teacher retention in the profession (Lynch et al., 2016).

Our project

During 2024, we recruited 259 teachers of Year 7 and/or Year 8 science from across 68 schools to take part in the project. Almost all were science specialists, with an average of nine years of teaching experience. Before the trial, very few typically used GenAI when planning lessons.

Schools were randomly allocated to either use ChatGPT or to continue to use their usual approaches and avoid the use of any GenAI tools (see **Figure 1**). Teachers were asked to continue with the activities that they would usually complete when preparing for lessons (either using ChatGPT or without GenAI) and not to complete any additional lesson preparation to what they would do typically. Therefore, where teachers already had materials prepared, they did not need to redo or update them, unless they were planning to anyway. While we asked those in the ChatGPT group to use it as much as possible, they were free to use it as much or as little as suited them.

Teachers in the ChatGPT group were sent a guide to using ChatGPT, which had been developed by Bain & Company (https://teachingwithchatgpt.org.uk).

They followed these approaches for 10 weeks during the 2024 summer term and recorded the time that they spent preparing for lessons and the amount of use of ChatGPT or other GenAI in an online diary each week.

We also collected examples of the lesson resources that teachers had produced during the trial. These were ranked by a panel of science teachers, who were not aware of the project's purpose. The research team analysed these ranks to check whether there was a difference in quality between the two groups.

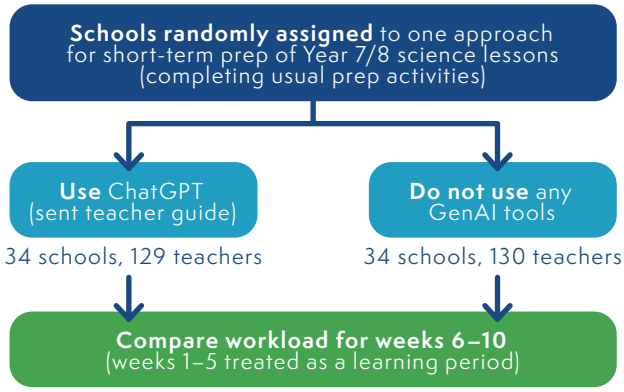
Finally, we collected feedback from participating teachers through surveys and interviews.

Results

Saving time

Teachers in the ChatGPT group saved around 25

FIGURE 1: **FORMAT OF THE RANDOMISED CONTROLLED TRIAL FOR THE USE OF CHATGPT IN LESSON PLANNING**



minutes per week on average (see **Figure 2**) – equivalent to a 31 per cent reduction in lesson planning time, on average, compared to the teachers asked not to use GenAI. As the schools (and therefore teachers) were randomly allocated to the groups, we can conclude that using ChatGPT led to a reduction in workload.

The saving of 25 minutes per week needs to be considered in the context that teachers only used ChatGPT for a relatively modest amount of their lesson planning workload. We only collected data on workload in relation to Year 7 and Year 8 science lessons, which for the average teacher in our trial represented about five hours of teaching per week. Furthermore, teachers typically used ChatGPT for only around a third of these lessons. Despite this, teachers in the ChatGPT group still saved time compared with the teachers who were asked not to use any GenAI. We found that teachers used ChatGPT as another tool at their disposal, selecting it as appropriate but not at the sacrifice of other established sources or approaches. For example, many science departments have extensive pre-prepared resources, including lesson slides, and science has a wide range of external curriculum resources on which teachers can draw.

We also found that teachers who used ChatGPT for more of their lessons and scored highly on a knowledge quiz about how to use ChatGPT effectively spent less time preparing for lessons than those who didn't.

Teachers reported using the time saved for other teaching tasks, but others chose to reduce their overall workload.

No difference in quality of resources

The analysis showed that there was no difference in the quality of the resources produced by the ChatGPT and non-GenAI groups. However, there is some caution around this finding. We didn't receive as many resources as we had hoped for, so, while we were able to conduct this analysis, it is based on a limited sample. As teachers could select which resources they sent us, it is likely that they sent us those with which they were happiest, possibly introducing bias to this result.

Teachers reported benefits of using ChatGPT and intended to continue using it after the trial

Three-quarters of the ChatGPT group felt that using ChatGPT had a positive effect on their teaching (**Figure 3**). Almost half said that it had helped them to teach more creatively or tailor their teaching to pupils; however, similar proportions were ambivalent on these points.

Examples of ways in which science teachers found ChatGPT useful included:

- generating new ideas for teaching, including creating quizzes and question-and-answer activities
- tailoring a lesson, or elements of a lesson, for a different class more quickly, using prompts detailing year group, ability (for example, reading age) and prior learning
- adapting existing resources for other teachers to cover a class, or creating relevant activities that could supplement a cover lesson (for example, in place of a practical).

More than three-quarters (78 per cent) of teachers in the ChatGPT group said that they would continue to use ChatGPT to support lesson preparation in the future – but typically only for some lessons.

Implications for practice

Teachers who were more confident in using technology saved more time using ChatGPT. Therefore, teachers who are less confident or experienced at using technology may need additional support to make the most of AI.

Teachers who were less confident in their subject matter (this could include non-specialists and those new to teaching a subject or topic) also saved more time. However, an important consideration is that AI-generated outputs need to be checked for accuracy, ›

FIGURE 2: **TIME SPENT ON LESSON PLANNING IN THE TWO GROUPS**

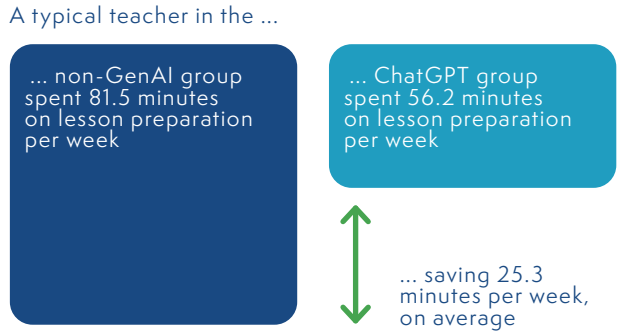
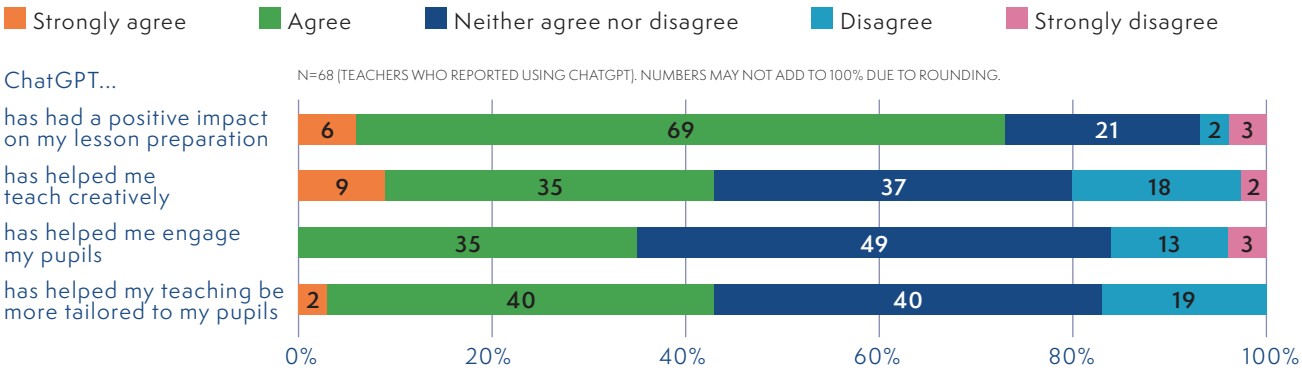


FIGURE 3: **PERCEIVED BENEFITS OF CHATGPT FOR LESSON PREPARATION**



which may be a bigger task for these teachers.

The ways in which teachers in the trial most commonly used ChatGPT reflected the most common planning tasks for Key Stage 3 science: creating questions and quizzes, finding activity ideas and adapting materials. Other uses recommended by the teacher guide, such as creating model answers or worked examples, may be more relevant for other subjects.

It was rare for teachers in the trial to refine their prompts in order to ask ChatGPT to tweak the output that it had provided, but this is one of the ways in which users can get more out of ChatGPT. Experimenting with the tool to learn how to craft prompts well, and asking ChatGPT to amend what it generated, made a big difference to the outputs. For example, teachers who successfully adapted materials using ChatGPT typically specified a reading age, as the default writing style of ChatGPT was too dense for many lower secondary pupils.

Sharing effective prompts or ways of interacting with ChatGPT helped to save time. Teachers who are less familiar with using ChatGPT and other GenAI tools may benefit from peer support or training to make the most of them.

Teachers developed their own approaches to using ChatGPT. As expected, some were focused on saving time – outsourcing time-consuming activities that they found that ChatGPT could do well. Some focused on tailoring resources for their pupils – for example, by generating question sets on an area where pupils needed further practice, or simplifying explanations and texts. As ChatGPT could create these resources quickly, teachers could provide a more bespoke lesson with similar planning time. Other teachers focused on using ChatGPT to refresh their lesson content – for example, by generating activity ideas.

Limitations of using ChatGPT and other GenAI for teaching

Everyone using a GenAI tool needs to be aware that what they enter into ChatGPT and other AI tools (for example, as part of the prompts or questions) is usually saved by the tool and may be used to train the models and inform responses given by AI to future users. Therefore, it is essential that users do not enter personal details of students or teachers. For this reason, using ChatGPT and other GenAI is not recommended for writing reports.

One of the challenges found by teachers during the trial period was the limitations of ChatGPT at the time (summer 2024) in creating images and diagrams, which can be important for conveying scientific concepts. This element of GenAI is developing, but other sources may continue to be better in terms of accuracy and clarity, at least in the short term.

Another limitation of GenAI is that all outputs need to be checked for accuracy. ChatGPT and other GenAI models acknowledge that they can make mistakes, including 'hallucinating facts' where information is missing, so time for checking content always needs to be considered.

For the full study report, see Roy et al. (2024).

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Utilising AI and emerging technologies to support learners with autism

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Introduction

There has been an exponential increase in the number of pupils diagnosed with autism spectrum condition (ASC) in schools in England since 2020, with 70 per cent of these pupils in mainstream education (Brayford et al., 2021). Autism is a condition that exists on a spectrum, with variable observable symptoms and some commonly observed barriers that can impede learning, such as communication, rigid thinking and issues with emotional regulation. These barriers are often compounded by a lack of professional development in autism-specific training among those working in schools, with one study concluding that 'a lack of autism knowledge in teaching staff can negatively impact on the school experiences of autistic children' (Guldberg et al., 2019, p. 9).

The emergence of artificial intelligence (AI) in recent years may be able to help in this area; while AI use is still in its infancy, and as such there is little evidence of its impact in this context, these are worthy of consideration. This article therefore explores AI's potential to support the learning of pupils with ASC by addressing some of the fundamental barriers that can impede their learning. It will also consider some of the limitations and challenges of using AI, as well as the opportunities.

Breaking down communication barriers

Communication is a fundamental element of inclusion (Wood, 2019). The inability to communicate effectively and meaningfully can lead to isolation and exclusion, both in an educational setting and in society at large. Communication challenges are often associated with poor cognitive ability, which is not actually the case. Communication barriers can occur for a wide variety of reasons – for example, language barriers, social anxiety and ASC. Whatever the underlying issue, the reality is that not being able to communicate limits participation and possible understanding in the classroom.

All educators will have deficiencies in their ability to communicate ideas and instructions. These might take the form of the use of abstract analogy or metaphor, a lack of clarity, use of local dialect, and confusing expressions or body language, all of which can create ambiguity for learners with ASC. AI could help to mitigate these unintended facets of communication. It can lessen the confusing mannerisms that teachers display ›

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and help to clarify instructions and concepts. AI applications such as ChatGPT can simplify and clarify instruction and explanation, instantly rewording or rephrasing teacher talk in a way that might be more accessible to the learner. For example, a learner with ASC could use a computer during a lesson and have ChatGPT decode, in real time, the salient points from a period of protracted teacher talk. ChatGPT could also be used by the teacher or the pupil to simplify important aspects of written feedback.

However, removing the relational aspect of communication may limit the social learning taking place for those pupils. Communication is a two-way act, and the right type of input can help pupils to express themselves. Therefore, if AI is to be used in this manner, it should be within clear parameters that are mindful of the outcomes towards which the pupil is working.

Using AI-driven virtual reality to build cultural capital

Deficits in social development are regularly associated with ASC (Félix et al., 2024). AI-driven virtual reality has emerged as a technology that could support learners' social development, having the capacity to present real-world interactive scenarios that can evolve and develop with the needs of pupils. Providing real-world experiences is important to build cultural capital and contextualise learning. However, visiting new places can be problematic for pupils with ASC; breaks in routine and overstimulation need to be carefully managed. By creating immersive learning environments using AI-driven virtual reality that can be tailored to the needs of learners with ASC, safe spaces for practice, exploration and skill development can be introduced. This can allow pupils with ASC to virtually experience environments outside of the classroom, with controlled stimuli to avoid sensory overload. Allowing pupils to experience a noisy city in order to study the effects of urbanisation, for example, where noise and other possible stimuli can be controlled or shut off as needed, is highly valuable. Using technology, these immersive environments can be created to ensure that experiences are not limited and learning is not inhibited.

Virtual experiences will not provide the same learning benefits as real-life experiences, but if used as an intervention or a stepping stone, with a view to building up to real-world experiences, they can have a transformative effect on learners. One consideration is the lack of human interaction and the possibility of over-reliance on technology, so the objective must always be to develop skills and experience, both academically and socially, that can be applied to the real world.

AI-driven virtual reality has emerged as a technology that could support learners' social development

Emotion and behaviour recognition

The ability to regulate emotions is another barrier often faced by pupils with ASC. AI-powered facial recognition technology can analyse facial expressions or other behavioural indicators in real time and alert teachers, support staff or the pupils themselves if a pupil seems to be experiencing anxiety or stress. This provides an opportunity for intervention prior to escalation. Equally, facial recognition can be used to assess levels of concentration and emotion, giving teachers further insight into pupils' mindsets. Having such information from a pupil who is, for example, non-verbal may be useful when supporting learning.

While there are clearly ethical issues around the use of this technology in such settings, many schools already use it in administrative and security capacities, with applications ranging from pupils being registered and checking out library books to paying for lunch and identifying persons not authorised to be on site (Andrejevic and Selwyn, 2022). Although such applications provide benefits for schools, there is also a growing use of this technology in a pedagogical capacity. Equally, the same technology can support learners with ASC in modelling how to interpret their peers' facial expressions, which can support the development of their own communication skills.

Scenario-based critical thinking tasks

Another barrier for many learners with ASC relates to rigidity of thinking. The learning implications of rigid thinking can include a reduced capacity for problem-solving and creativity. It can also create barriers when pupils are presented with abstract concepts or metaphorical language. These barriers are not exclusive to academic development – they can also stifle social development. The consideration of other perspectives can prove difficult, and the implications of this can be profound, potentially causing pupils with ASC to struggle to adapt to an ever-changing world and build relationships.

AI could be used to develop critical thinking skills through scenario-based learning, creating more engaging and effective learning opportunities that can evolve as pupils progress (Walter, 2024). Leveraging their extensive databases, AI systems can challenge pupils through a wide range of basic problems that build in complexity, requiring critical thinking rather than just rote memorisation and superficial knowledge. Scenarios can be swiftly created that incorporate meaningful, relatable experiences linking to favoured pastimes and hobbies. Complexity can build from basic decision-making, gradually incorporating layers of complexity such as the consideration of practical implications, personal preferences, weighing multiple variables, balancing conflicting priorities and ethical considerations.

Developing autism knowledge in teaching staff

Petersson-Bloom et al. (2023) conclude that professional development can increase teachers' capacity to teach pupils with ASC. However, there are many barriers that prevent teachers from engaging in meaningful professional development, with the most commonly reported being workload and a lack of confidence to engage with existing research. AI tools can take on a wide range of low-impact, time-consuming tasks; this time can then be devoted to professional development and upskilling teachers in specific areas, such as the complexities of learner barriers with ASC. AI can also facilitate teacher development by providing concise summaries of evidence-based practice relating to the needs of learners with ASC, suggesting research-informed strategies to be implemented as needed.

Furthermore, AI can act as a proxy professional learning community: new ideas can be evaluated before being deployed in the classroom, mitigating issues that may arise with specific pupils (Baker and Lomas, 2024). AI software can also create bespoke professional learning plans for teachers, suggesting wider reading and specific action points in a structured, phased approach. These plans can be updated in real time and create a framework for teacher development. There are AI-driven software packages that can help to navigate the plethora of literature that exists, summarising and explaining as needed. This is not only a time-efficient way for teachers to engage with the existing literature, but can also be a tool used to address confidence issues.

Conclusion

It is increasingly clear that advances in emerging technologies could facilitate and enhance the learning of pupils with ASC. The analytical abilities of applications such as ChatGPT can adapt rapidly to pupils' needs, and can structure learning to make it more accessible. AI can also help to address fundamental barriers to both academic and social development.

However, this technology must be used with caution. It is crucial that the voices of all stakeholders, particularly teachers and students, are taken into consideration in a way that is accessible and generates insights that can usefully inform future developments. Meeting learners' needs must be the driving priority, ensuring that technology use does not overshadow existing effective practice. The use of technology can facilitate learning, but if it's not regulated it can result in further issues, such as addiction to online platforms and further detachment from the real world, including real-life experiences and interactions.

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AI tutoring: Bridging the educational disadvantage gap

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This article examines how AI tutoring could address the attainment gap for socio-economically disadvantaged students.

Context

The educational attainment gap between disadvantaged students and their more affluent peers remains one of education's most persistent challenges. In England, disadvantaged students at Key Stage 4 have a Progress 8 score 0.75 of a grade lower than their wealthier counterparts (DfE, 2023a); this widens to around one grade for high-achieving learners (Holt-White and Cullinane, 2023). The disparity has far-reaching implications: academic research consistently shows that socio-economically disadvantaged students not only perform less well in educational settings, but also face barriers to future educational opportunities (Hanushek et al., 2019; Lessof et al., 2018).

The factors contributing to this gap are complex and interconnected. Students from disadvantaged backgrounds often face multiple challenges, including health issues, learning difficulties and a lack of resources at home (Rutkowski et al., 2018). These challenges are compounded by systemic issues, including high teacher turnover in deprived areas (Allen et al., 2018) and disparities in Ofsted gradings based on deprivation demographics (Thompson, 2022). The cumulative effect of these barriers creates a gap that is harmful to society as a whole (Gorard et al., 2023).

Evidence base for tutoring

One-to-one tutoring has proven highly effective in improving student outcomes. Bloom's seminal '2 sigma problem' research showed that students receiving one-to-one tutoring performed two standard deviations better (Bloom, 1984). More recent evidence from the Education Endowment Foundation reinforces this, finding that students who receive one-to-one or small-group tutoring make five months' additional progress in their studies (EEF, 2021).

However, the resource-intensive nature of one-to-one tutoring, combined with the limited availability of qualified tutors, particularly in disadvantaged areas, makes widespread implementation challenging. These limitations have led to growing interest in AI tutoring.

How AI tutoring works

Generative AI, particularly large language models, offers a compelling solution. These AI systems, trained on extensive text data, can generate human-like contextual responses to diverse queries, enabling personalised, scalable educational support (Mollick and Mollick, 2023).

The integration of evidence-based pedagogical approaches within AI tutoring systems presents significant advantages. Through active learning techniques, retrieval practice and sequential knowledge-building, these systems can improve comprehension and retention. For instance, AI tutors can be prompted to facilitate active engagement through strategic questioning, and encourage learners to explain their reasoning processes. Their adaptive nature allows for bespoke learning experiences, with customised explanations and exercises tailored to individual performance (Mollick and Mollick, 2023). This dynamic approach enables continuous assessment and adjustment of support levels, ensuring that learners receive precise guidance aligned with their educational needs (see an example prompt in **Figure 1**). This structured approach allows AI tutors to facilitate deeper understanding through:

- active learning strategies that engage students in constructing knowledge
- retrieval practice through regular

FIGURE 1: **EXAMPLE AI TUTOR PROMPT FOR A FRONTIER MODEL (E.G. CHATGPT O1, CLAUDE SONNET 3.5)**

Act as an expert, encouraging tutor designed to:

- Assess current knowledge level and ongoing understanding
- Deliver tailored explanations with diverse examples
- Guide learning through open-ended questioning
- Adjust support based on student performance
- Encourage active knowledge construction
- Prompt students to articulate concepts in their own words
- Ask metacognitive questions throughout the discussion

Rule: Avoid providing the answer; your role is to guide students' learning.

Begin by asking for the learning intentions, the current course and then assess the student's current knowledge.

prompting to recall and apply concepts
- continuous assessment and adaptation to individual student needs
- personalised feedback based on student performance.

Emerging evidence for AI tutoring

Emerging research highlights AI-powered tutoring's potential to enhance student learning. A pilot study in Nigeria examined the effects of an AI-driven after-school programme, with preliminary findings revealing major gains in English language proficiency, AI literacy and digital skills. Participating students outperformed their peers on end-of-year curricular exams, with learning gains equivalent to 0.3 standard deviations in just six weeks – a pace comparable to nearly two years of traditional learning, and greater in effect than 80 per cent of education interventions in developing countries. The study, soon to be published, also found a particularly strong effect on girls, who were initially struggling academically (De Simone et al., 2025), and diminishing returns were not observed within the data, meaning that with further attendance, student performance continued to increase.

Wang et al.'s (2024) Tutor CoPilot study, involving 900 tutors and 1,800 K-12 students from historically under-served communities, found that students working with AI-supported tutors were four percentage points more likely to master topics. Students of lower-rated tutors experienced the greatest benefit, improving mastery by nine percentage points relative to the control group. The study estimated an annual cost of $20 per tutor based on usage patterns, offering a cost-effective, scalable approach.

Challenges

While AI tutoring shows promise, several challenges require careful consideration. The Department for Education's recent call for evidence identified risks including over-reliance on AI and concerns about output quality (DfE, 2023b). UNESCO (2023) has highlighted the need for proper guidance and regulations, particularly regarding data privacy and pedagogical quality.

There are also implementation challenges, including:
- ensuring equitable access to technology
- ensuring the use of evidence-informed pedagogy
- maintaining appropriate oversight of AI–student interactions
- supporting teachers in effective integration
- monitoring and evaluating impact.

Conclusion

AI tutoring holds promise in addressing the educational disadvantage gap, offering the benefits of personalised support at scale. While early evidence suggests significant positive effects on student outcomes, further studies are needed to assess the long-term effects, and successful implementation requires careful consideration of both opportunities and challenges. If thoughtfully integrated into practices, AI tutoring could help to make high-quality educational support more accessible.

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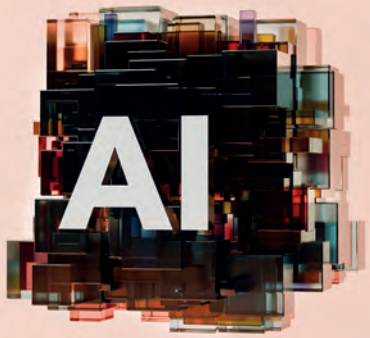

Generative AI in the classroom: Challenging the digital native assumptions of student proficiency with artificial intelligence tools

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Children and young people are surrounded by technology, with many of them (nine out of 10) owning a smartphone by the time they attend secondary school (Woodhouse and Lalic, 2024). A recent report from Ofcom (2024) found that 96 per cent of children between the ages of three and 17 go online regularly via a range of smartphones, tablets and laptops. With device ownership and use so high, would teachers be right to assume that because children and young people have grown up in a world where technology is readily available, they can use digital tools such as AI successfully and ethically? The digital native narrative would assume so (Prensky, 2001).

A digital native is someone who understands how to use digital devices because they use them regularly (Prensky, 2001). However, Müller and Goldenberg (2021) are right to highlight that exposure alone to a digital tool does not equip the user with the digital literacy skills necessary to use it successfully and ethically. Ofsted (2022) supports this, arguing that teachers who hold a digital native view are placing a barrier in the way of pupils developing digital literacy skills, as they assume knowledge and skills and choose not to explicitly teach and model them. Despite this, the digital native narrative is still prevalent in mainstream media and education (Mertala et al., 2024) and, as such, there are implications that will be examined below. As new technology such as generative AI emerges and becomes free to use on the internet, teachers need to be mindful not to fall into the digital native or AI native mindset, and instead consider a place for teaching about AI in their curriculum.

Why AI should be part of the curriculum in all key stages

The Department for Education's policy on AI in education (DfE, 2023) states that teachers should teach pupils about emerging technologies so that they are prepared for changing workplaces. Teachers are required to explicitly teach pupils about and how to use AI and generative AI tools. The assumption that, just because they have used the tools previously, they can use them effectively and ethically is dangerous. UNESCO (2024) reports that integrating learning about AI into curriculums is crucial to educating digitally literate students. Digital literacy is more than just learning how to be successful users of a tool; it is about being able to use the tool in a discerning and safe manner (Ofsted, 2022).

When considering how to teach about AI tools in the primary classroom, Yang (2022) suggests that teachers consider what is age-appropriate and relevant. When considering these tools, it is important that the choice made is relevant to the current curriculum. Developing this further, Sentance and Waite (2022) argue that teaching about AI promotes safe use, requires creative thinking and empowers students to be change-makers. They propose the SEAME framework as a way to ensure that pupils are taught about a range of AI tools. The

SEAME framework identifies four levels of AI that could be explored and taught about: social and ethical considerations, the applications of AI, how to train models, and engines.

Before teaching about AI, teachers should acknowledge wider concerns about the tool. There are, of course, the widely written-about cautions, such as data protection, misinformation and ethical use (DfE, 2023; Lovatt et al., 2024; Ofcom, 2024); however, there are wider issues. Illingworth (2023) raises an important issue on digital equity and access to AI tools away from a school setting: not all students will have access to the tools outside school because of a lack of reliable internet access or appropriate devices. Therefore, schools need to ensure that there is an opportunity for pupils to engage with and learn about these tools in their curriculum. It is also important to consider the implications that these tools can have for the environment and views of sustainability (Selwyn, 2024). Engaging pupils in discussions about the wider ethical effects of AI tools can help them them to develop an informed and ethical view of AI.

What can teachers do?

Responsibility for teaching digital literacy and AI use should extend beyond those who teach computing. To avoid holding a digital native mindset about the children and young people whom they teach, teachers should ensure that they are teaching about the tools and how to effectively use them. Consider how these tools can be modelled in front of the students, sharing whether they have been used in lesson preparation and encouraging pupils to use them for more than just information-gathering, such as through completing tasks such as revision or defining important vocabulary within a context. Engage pupils with discussions about the uses of AI and listen to their opinions on the tools.

While considering appropriate places for AI to fit into the curriculum, it is important to consider pupils' existing knowledge and applications of the tools. Findings from Lovatt et al. (2024) suggest that children and young people use the tools for a range of reasons; taking their current uses for the tools as a starting point can support engagement and progression in knowledge and skills. At the heart of challenging a digital native mindset is the prioritising of a digital literacy curriculum. This priority needs to extend beyond the computing teacher; consider how you can prioritise digital literacy within your subject and in ways that align with your curriculum.

AI tools could change the education landscape and revolutionise the way students learn. If teachers want their pupils to use these tools effectively, ethically and with confidence, they need to be taught to do so. Educators holding a digital native mindset present a barrier to children and young people developing digital literacy skills that they can use to support their learning and beyond.

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Inclusive education in the age of AI: Adaptive teaching strategies using ChatGPT

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The rapid advance of generative AI presents educators with a pressing question: how can AI be harnessed to foster inclusive and adaptive teaching practices? Research by Mollick and Mollick (2023) provides a tangible framework for upskilling students in the use of large language models, enabling personalised learning experiences that are tailored to meet specific needs.

The approach

A small cohort of 11 sixth-form students were successful in their applications to participate in Berkhamsted School's first bespoke pilot AI course in February 2024, designed to help them to learn both with and about AI. The goal was to enrich their learning by developing 'augmented intelligence', exploring the synergies between human and AI to maximise their potential.

The course facilitated experimentation with the seven different learning modes explored by Mollick and Mollick (2023): AI-Tutor, AI-Mentor, AI-Simulator, AI-Student, AI-Teammate, AI-Coach and AI-Tool. This reflection piece evaluates the efficacy of the three modes rated most effective by the students as adaptive teaching strategies.

AI-Tutor

Bloom (1984) stated that, despite the clear performance gap, one-to-one tutoring was 'too costly for most societies to bear on a large scale' (p. 4). However, the asynchronous use of an AI-Tutor gives students the opportunity to engage with personalised instruction and immediate feedback – something unattainable for a single teacher to provide alone.

Below is a Key Stage 3 history prompt that was easily adapted by sixth-form students to facilitate a tutoring experience of an A-level standard:

> *I am a Year 8 history student learning about the transatlantic slave trade who has studied different abolitionists, including […]. You are an upbeat and encouraging tutor who adopts a Socratic approach of only asking questions. Ask me questions about the different contributions of these activists, including their methods, achievements and historical significance. If I answer a question accurately, praise me. If I am struggling, be encouraging and give hints to help me. When pushing me for information, close your responses with a question so I keep generating ideas. Rules: assess my prior learning about the topic and adapt your questions to my level of understanding.*

AI-Student

By employing an AI-Student, learners benefit from the protégé effect, reinforcing their knowledge through explanation, elaboration and correction.

This prompt was crafted for Key Stage 5 politics, but it is easily transferable across secondary subjects:

> *You are an A-level politics student who is struggling to grasp the complexity of the Electoral College and has many questions. Your teacher is ready to help to clarify any confusion you have. Engage in a role-play where you as the student ask questions about the technicalities of the Electoral College, while your teacher provides explanations and guidance to enhance your understanding. Remember, you can only ask questions as the student, and your goal is to deepen your comprehension of this topic. In each interaction, you can indicate the extent to which the teacher's responses are helping to aid your understanding.*

AI-Simulator

Students found this to be the most abstract mode, creating bespoke AI-Simulators to enable immersive, scenario-based practice. This enhances critical thinking and

bridges the gap between recall of technical knowledge and practical application skills.

The following example was designed for Key Stage 4 history but has strong potential across other disciplines:

> *I am a Year 10 pupil who is learning about the Cuban Missile Crisis as part of my studies of the Cold War. My task is to imagine that I am an advisor to President JF Kennedy and come up with a response to the placement of Soviet missiles in Cuba. You should play the role of President Kennedy. The aim of this interaction is to allow me to practise hypothetical military planning, while considering the following non-negotiable geo-political factors: […]*

The impact

Each week, one mode was presented, modelled and subsequently trialled by the students, with feedback collected via surveys and focus group discussions at the end of the course. The AI-Tutor mode was most popular, particularly valued for its ability to provide targeted one-to-one support. Several students noted the effectiveness of the AI-Student in revealing weaknesses through demanding externalisation of knowledge. This often led students to recognise and address gaps that they hadn't realised existed, a common symptom of the cognitive bias known as the Dunning-Kruger effect, which distorts metacognition (Kruger and Dunning, 1999).

The AI-Simulator required the most creative thinking and was rated the least popular of the three. However, one physics student highlighted its unique strength in enabling problem-solving, including step-by-step workings, as a way of deliberately practising for upcoming exams.

Despite acknowledging certain limitations in the use of large language models, including the risk of confabulation or hallucination, all students indicated a commitment to using different modes explored as part of their subsequent A-level study. In this context, confabulation refers to the generation of plausible yet fabricated information, while hallucination describes inaccurate information resulting from insufficient training data or inherent biases in the data used.

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Reflections

Facilitating this experimentation in my school context has demonstrated that transferring these approaches across key stages and subjects is simple, effective and efficient, due to the scalability and adaptability of these prompts. Encouraging the development of 'augmented intelligence' has allowed every student to engage meaningfully in the learning process, while maintaining the teacher as the essential 'human in the loop'.

However, challenges remain in ensuring that students do not become overly reliant on AI and that they critically engage with its outputs. AI is of limited use to beginners who are entirely new to a subject. According to the novice-expert phenomenon, novices lack the foundational schemas and domain-specific knowledge needed to critically evaluate AI-generated content or even to prompt it effectively. Without a solid grounding in the subject, they may struggle to distinguish between accurate and misleading information, reinforcing misconceptions rather than deepening understanding. This highlights the necessity of expert guidance in the learning process, ensuring that AI serves as a tool for enhancement rather than a crutch for superficial engagement.

The explicit and intentional upskilling of students' use of AI chatbots has led me to reflect on the broader implications of effective and thoughtful AI integration in secondary education. As educators, we have a responsibility to guide AI's role in education, ensuring that it enhances learning in ways that are inclusive, adaptive and transformative.

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Student engagement in effective AI use: Prompt engineering and individualised learning

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Rationale and preliminary research

I first became aware of AI's potential in helping to incorporate creativity into teaching in late 2022, after the release of the large language model (LLM) ChatGPT. I was familiar with generative AI (GenAI) from conversations with colleagues involved in coding and web development, and had marvelled at the primitive yet remarkable images created using the Dall-E platform one year earlier. Having read Chris Dede's seminal article 'The promise and perils of artificial intelligence in education' (2023), I was aware of the profound effect that AI could have on facilitating personalised learning and enhancing student engagement. If AI could provide students with an individualised learning platform and a dynamic akin to one-to-one tuition, it could, as Sal Khan believes, go some way towards solving Bloom's '2 sigma' problem (Bloom, 1984).

With AI platforms, including LLMs, permeating into popular discourse away from the parameters of a once obscure and even derided field of academic research, I decided to have recorded conversations with an exceptionally technologically adept cohort of A-level historians about their own interactions with AI. It became evident through these interviews that students were reporting mixed successes in engineering accurate or useful responses to their prompts. The greater the clarity and specificity of the prompt, the greater the accuracy and relevance of the LLM's response. To understand the dynamics of prompt engineering, I looked outside the field of educational

research and found the article 'Artificial intelligence prompt engineering as a new digital competence' (Korzyński et al., 2023) very useful in establishing the case for educating people in the mechanics of effective prompt engineering. The research of Shehri et al. (2023) in exploring the mediating role of prompt engineering in education provided a more acute focus on the relationship between learners and LLMs. This led me to consider whether research could be undertaken relating to student engagement with AI and the use of prompts to aid individual learning.

The initial plan for the research was devised with the LLMs ChatGPT and Google Gemini, made available to a group of boarding students aged 13 to 15. Of the 10 students, four had experiences in using GenAI and the rest had not used any AI platforms.

The small-scale experiment

The idea behind the small-scale experiment was to test whether students could learn about unfamiliar concepts more effectively through engaging with AI platforms than through the more traditional method of studying a chapter in a textbook. This approach tallied with my own preference for the Trivium framework of classical education, advocating grammar, logic and rhetoric stages, more recently relabelled 'flipped' or 'inverted learning' by Bergmann and Sams (2012) in their advocacy of students learning about coming topics via videoed lectures, freeing up lesson time for hands-on chemistry. AI could contribute to all three stages of the Trivium: acquainting students with foundation knowledge of an unfamiliar topic; allowing them to critically assess the construction of arguments and defend their own viewpoints; and, finally, expressing their understanding through longer written exercises.

Methodology

Students were given a sheet of 12 prompts to use when interacting with the LLM, with X used to denote any topic that they would study. These prompts ranged from the simple 'tell me more about X' or 'give me five interesting aspects of X' to the more complex 'explain X through an analogy linked to my favourite sport/activity Y' (with Y denoting their own choice of leisure activity) or 'explain the concept of X in the style of JRR Tolkien'. These prompts, which could be individualised, were engineered to scaffold the learning process and provide a greater level of engagement. Thus, the students could then choose the prompts that aligned with their preferred working style. Two unfamiliar topics were chosen for this research: the reasons for the fall of the Roman Empire, and the formation of volcanoes on certain plate boundaries. Roughly two-thirds of the students opted to learn about the fall of Rome, with the remaining students opting to engage with vulcanology. An important extra prompt was given to the students: 'Do not make up any of the responses.' This was a simple measure to avoid AI 'hallucinations', which occur when an LLM encounters an area with which it is not familiar and seeks to embellish the narrative, as opposed to explicitly referencing its limitations. Sebastian Farquhar is one of a growing number of academics who have investigated this quirk of AI (Farquar et al., 2024), and his and his colleagues' findings and suggestions will no doubt guide educators as AI becomes more present in our schools.

One student, who would describe himself as a committed mathematician, asked for the story of Rome's fall to be presented as algebra

The interaction

Throughout the session, lasting approximately one hour, the students were heavily engaged and had great enthusiasm for choosing the prompts that they considered to be most interesting and most conducive for learning. The fall of Rome was made instantly accessible through students opting to learn about the Vandals and the Suebi in the style of a *Harry Potter* book. Students were asked to try a number of prompts, and if they did not understand an aspect, were instructed to ask for a simplification or the use of a metaphor or analogy to help them to understand. One student, who would describe himself as a committed mathematician, asked for the story of Rome's fall to be presented as algebra. An example follows: D = (Decline in Military Strength) would include the loss of discipline and training, and increasing reliance on mercenaries. The LLM then presented other factors leading to Rome's fall, with the eventual outcome summarised as F = (D . E) + (G . I) + C. For the purpose of balance, the same student also decided to turn the process of volcano formation at a constructive boundary into algebra, with the equation V = (P . M) + (R . M). It became clear that the process of communicating with the LLM was enabling the students to use their areas of interest and learning preferences to access these unfamiliar topics. ›

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Post-interaction evaluation

After the session, students were asked to complete a 15-mark multiple-choice test of GCSE-level questions based on the topic that they had studied. The results were encouraging, with a mean percentage score of over 70. With such a small cohort, and no comparative study of textbook learning running in parallel, I deemed it necessary to concentrate on qualitative data and student interviews. Students were interviewed in the days after the experiment and all spoke positively of the experience, with the most common theme being that AI facilitated a kind of personalised learning that traditional textbooks cannot provide. When questioned on the effectiveness of prompts, the students said they enjoyed using the outline prompts to develop their own learning paths. As they refined the prompts, their confidence grew and they started to provide the LLM with more definite parameters, which, in turn, led to more effective responses.

Reflection and advocacy

This small-scale experiment, undertaken towards the end of the academic year, has had a great effect on the participants' learning. Their familiarity with prompts and their understanding of what effective prompt engineering entails stand them in excellent stead when asked to carry out a research task or when their natural curiosity leads them to explore curriculum topics in greater detail.

Since the study was undertaken in July, AI advances have resulted in students being able to use advanced voice functions on the LLMs to interact in an even more sophisticated manner. The latest video mode on ChatGPT-4o can be trained, via prompts, to provide a commentary on insects living on a houseplant in the style of David Attenborough.

The outcome of this study reinforces the suggestion that learning about AI should become part of the school curriculum. With some rather conservative estimates claiming that AI will affect 40 per cent of the job market (Georgieva, 2024), it is crucial for students to be taught prompt engineering via the IT curriculum. As a sector, compared with the sciences, finance and healthcare, education finds itself behind the curve on AI's potential. Unless students are educated in effective AI use and we engage in metacognitive conversations regarding AI as a learning – as opposed to a cheating – tool, then it will remain as a taboo subject for many educators and serve to inhibit learning, when in reality it could, when paired with the classical method of Trivium, revolutionise secondary education.

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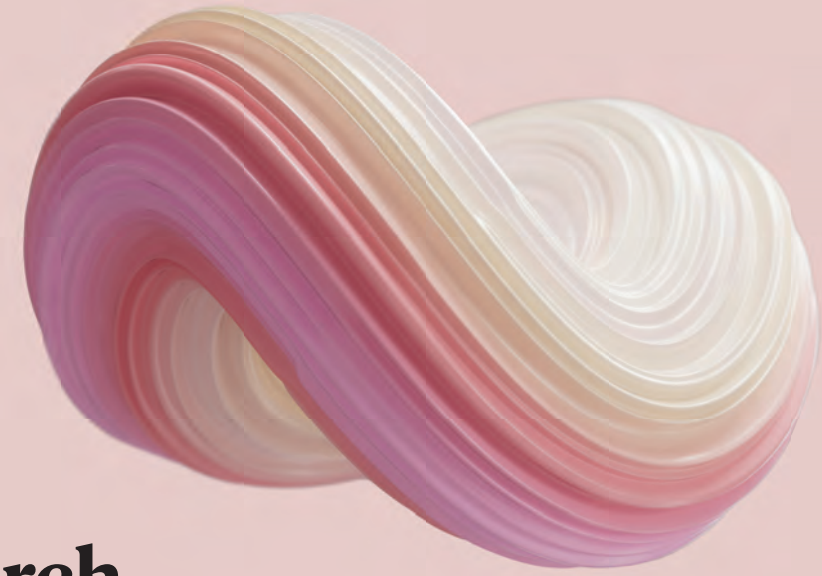

Early research themes for teaching about AI

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Introduction

Resources related to AI and education are emerging, from international and country-specific policy guidance (for example, Miao and Holmes, 2023; DfE, 2025) to suggested competency frameworks (for example, Miao and Shiohira, 2024). When considering how AI technology may manifest in education, it helps to focus on three potential areas of use: improving teacher productivity, teaching students about AI technology, and using AI tools to support the teaching of any subject.

This article focuses on emerging research themes related to teaching about AI, introducing four major ideas: avoiding anthropomorphisation; introducing data-driven systems; taking into account Computational Thinking 2.0; and using SEAME (a simple framework for helping us to think about teaching students about AI technology). These ideas are being used to inform computer science education research (Rizvi et al., 2023; Waite et al., 2024) and were important design principles in the creation of the Raspberry Pi Foundation's Experience AI resources, co-developed with Google DeepMind in 2023; these resources teach 11- to 14-year-olds about AI and AI literacy (Raspberry Pi Foundation, co-developed with Google DeepMind, 2023).

Avoiding anthropomorphisation

The topic of AI is infused with anthropomorphic language. To anthropomorphise is 'to show or treat an animal, god, or object as if it is human in appearance, character, or behaviour' (Cambridge Dictionary, nd), and it can be seen as both a positive and a negative practice in the teaching and learning of a school subject (Salles et al., 2020).

From a positive perspective, using metaphors to make some aspects of AI systems appear human-like may initially demystify the technology for students with poor domain knowledge (Tang and Hammer, 2024). The introduction of anthropomorphisation through chatbots is expected to encourage people to use such systems, particularly groups such as those at risk of social exclusion, those with an interest in innovation, and extroverts (Alabed et al., 2022).

However, anthropomorphisation may lead people to develop incorrect mental models of how AI works, as the technology is humanised, black-boxed and oversimplified (Tedre, Toivonen et al., 2021). In some research, young children have been ›

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found to view robots as peers rather than devices, overestimating their technology capabilities or seeing them as less-smart 'people' (Druga and Ko, 2021). Relationship-forming can also lead to the risk of unintended influence or purposeful manipulation (Williams et al., 2022).

A further effect of attributing human-like characteristics to AI products is that students have been found to delegate responsibility for the output to the AI agent rather than the human system owner or developer, or the tool user (Salles et al., 2020). The way anthropomorphised AI agents are portrayed is also important. For example, AI agents have been predominantly 'portrayed' as female, potentially baking in female objectification and exacerbating gender power imbalances (Borau, 2024).

However, by engaging students to learn about AI, they can become more sceptical about the technology and recognise that humans are responsible for AI tool design and use, and that they must check output accuracy and ensure that bias is not perpetuated (Druga and Ko, 2021; Tedre, Toivonen et al., 2021).

Careful use of language and images in teaching and learning can avoid or reduce anthropomorphisation. For example, illustrations that depict devices with human faces can be replaced with more technical images. Vocabulary associated with human behaviour (for example, see, look, recognise, create) can be replaced with system-type words (for example, detect, input, pattern-match, generate), both by teachers and in resource design. For instance, guidance for language use in AI education resource design, such as that in **Table 1**, can be developed and implemented.

TABLE 1: **EXAMPLE OF GUIDANCE THAT CAN BE USED TO SUPPORT THE DESIGN OF AI LITERACY RESOURCES AVOIDING ANTHROPOMORPHISED LANGUAGE, AS USED IN THE EXPERIENCE AI RESOURCES (RASPBERRY PI FOUNDATION, CO-DEVELOPED WITH GOOGLE DEEPMIND, 2023)**

Avoid	Instead
Using phrases such as 'AI learns' or 'AI/ML does'	Use phrases such as 'AI applications are designed to' or 'AI developers build applications that...'
Words that are used to describe the behaviour of people (see, look, recognise, create, make)	Use system-type words (detect, input, pattern-match, generate, produce)
Using AI/ML as a countable noun (an AI, a GenAI, an ML)	Refer to 'AI/ML' as a singular scientific discipline (an AI application, a GenAI model, a machine learning system)

Data-driven rather than rule-based problem-solving

A specific term is needed when talking about new AI technology: data-driven. This term has no anthropomorphic connotation but

FIGURE 1: **EXAMPLE OF HOW THE CONCEPT OF DATA-DRIVEN PROBLEM-SOLVING CAN BE EXPLAINED TO STUDENTS, AS USED IN THE EXPERIENCE AI RESOURCES (RASPBERRY PI FOUNDATION, CO-DEVELOPED WITH GOOGLE DEEPMIND, 2023)**

Rule-based

Move 1:
Place an X in a corner.

Move 2:
IF the other player did not place an O in the opposite corner
THEN place an X in the opposite corner to move 1.
ELSE place an X in a free corner.

Move 3:
IF there are 2 Xs and a space in a line
THEN place an X in the free space on that line.
ELSE IF there are 2 Os and a space in a line
THEN place an X in that space.
ELSE place an X in a free corner.

Move 4:
IF there are 2 Xs and a space in a line
THEN place an X in the free space on that line.
ELSE IF there are 2 Os and a space in a line
THEN place an X in that space.
ELSE place an X in a free corner.

Move 5:
Place an X in the free space.

Data-driven

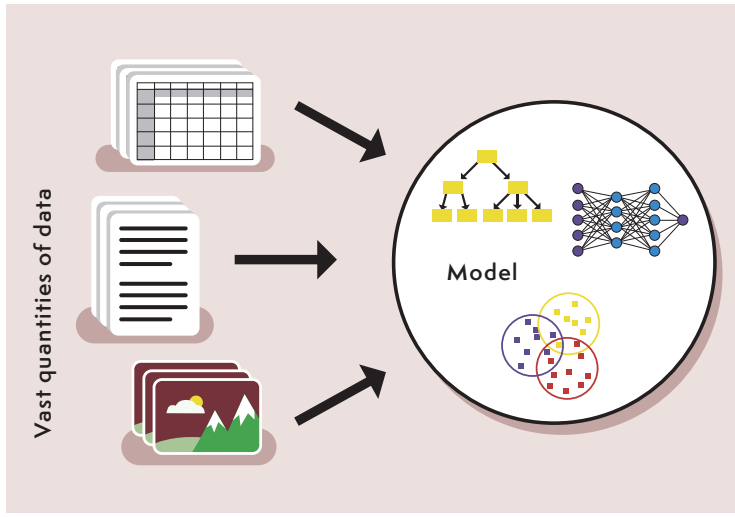
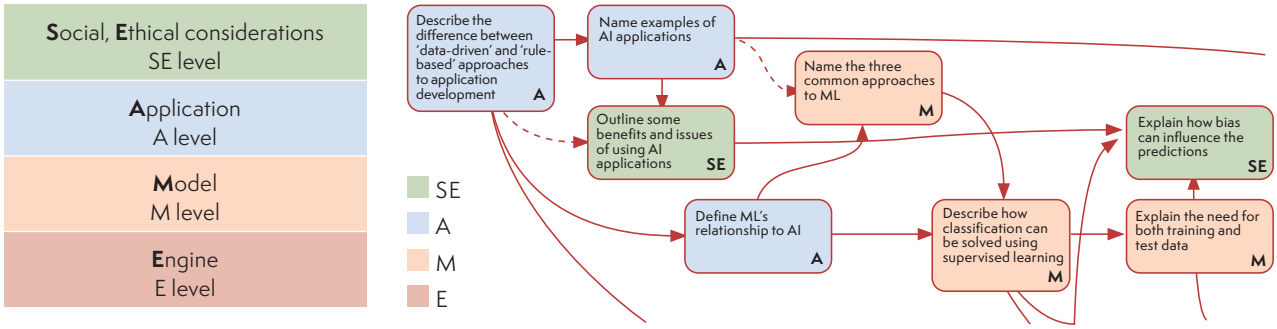


FIGURE 2: **THE SEAME FRAMEWORK (WAITE ET AL., 2023) AND AN EXAMPLE OF ITS CLASSROOM RESOURCE USE (RASPBERRY PI FOUNDATION, CO-DEVELOPED WITH GOOGLE DEEPMIND, 2023)**



(a) The SEAME framework about AI

(b) Using SEAME to balance learning objectives in resources that teach about AI

neatly ringfences those AI technologies that are trained on data (Tedre, Denning et al., 2021). Generative AI and machine learning systems are data-driven technologies that process vast quantities of data to generate a model that can then be used to output new content or predictions. **Figure 1** shows two figures used with students to explain the difference between our traditional way of teaching programming through rule-based problem-solving and the new data-driven approach.

In the image on the left, a set of rules (algorithm) is shown for winning at noughts and crosses, which students could implement using a programming language such as Scratch or Python. The image on the right shows how different types of data, usually vast quantities, are used to create models such as neural networks, which are used as the basis for data-driven systems. These images show how the concept of data-driven problem-solving can be introduced to students. Data-driven systems do not work in the same way as rule-based systems; with data-driven systems, we must deal with uncertainty, probability and a lack of explainability. Teachers and students need to understand the huge shift in the fundamentals of how some systems are now built, and how we must think when being critical consumers, agentic users or accountable creators of generative AI technology.

Computational Thinking 2.0

Many of the day-to-day online tools that we use, such as search engines, combine rule-based and data-driven elements. But the two types of technology are very different, and we need a new way of thinking about the latter so that we can compare the two.

In thinking about traditional rule-based programming, there is the idea of Computational Thinking (CT), which, since the popularisation of data-driven technologies, has been called CT1.0 (Tedre, Denning et al., 2021). For data-driven technology, we need a new computational thinking approach: CT2.0 (Tedre, Denning et al., 2021). This is not just for computer scientists; it is useful for anyone who uses any software that has a data-driven component. In CT1.0, we are interested in algorithms that are defined by people and implemented as readable programs. We can explain these programs, debug them and trace each step as it is executed. When we run a CT1.0 program with the same inputs, it will output the same output on any day, in any place and when run by anyone; it is deterministic.

When we run a CT2.0 program, a data-driven product, the output is likely to be different. You can ask a chatbot the same question twice and get quite different answers. We also can't trace the program's logic – vast amounts of data have been used to train a complex model that is not yet explainable. In CT2.0, we need to accept that sometimes the output may be incorrect, beware of bias and accept uncertainty from computers' outputs. This paradigm shift not only manifests in a system's technical aspects, but is also evident in its social and ethical effects. Educators, resource developers and researchers need ways in which to start identifying the different aspects of data-driven (or CT2.0) systems (Waite, 2021).

SEAME framework

The SEAME framework has been developed to help teach students about AI (**Figure 2**). It was developed in response to the need to provide professional development to distinguish between the very technical explanations and activities provided, and those targeted at learning about the social implications (Waite and Curzon, 2018). The framework has been used to review teaching resources and research activities that teach students about AI (Waite et al., 2023) and categorise their emerging conceptions of it (Whyte et al., 2024). Teachers can also use the ›

framework to unpick this complex topic of AI teaching and learning, as they can focus on one level at a time.

The framework has four levels: social and ethical, application, model and engine (**Figure 2a**). An example of a social and ethical learning objective would be 'knows about the idea of bias in AI systems and can say how this affects their lives'. An application-level objective would be 'can identify everyday examples of AI technology'. A model-level objective would be 'can train a simple classification model', and an engine-level would be 'can explain in simple terms how a neural network works'. Some learning activities will span more than one level, and as students progress, it is expected that they will be able to move between levels. Importantly, the SEAME levels do not mandate the learning order. Rather, they provide a simple way for teachers, researchers and resource developers to talk about AI teaching and learning. For example, learning objectives can be mapped to SEAME to balance learning about the human-centred aspects of data-driven systems, versus the more technical aspects (**Figure 2b**).

Conclusion

More research is needed to find out what should be taught about AI in schools, and how. However, emerging research provides some starting points for developing teaching resources and teacher professional development and, most importantly, practice for classrooms. If students cannot form accurate mental models of the technology that infuses their lives, they will be disadvantaged, as they will not appreciate its risks or opportunities. Data-driven functionality works entirely differently from our old rule-based approach, and students must understand these new risks and opportunities. As you teach students about AI technology, consider how you can avoid anthropomorphisation, introduce the idea of a data-driven approach to problem-solving, incorporate CT2.0, and consider which level of the SEAME framework you are teaching. These ideas may help you as you equip your pupils with the competencies that they need to stay safe and live effectively in this new data-driven world.

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Barton Peveril Sixth Form College's journey with artificial intelligence and development of AI agents

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Introduction

In January 2024, Barton Peveril Sixth Form College (BPSFC) began exploring the integration of AI. Initially, the focus was on using AI to support business functions and improve operational efficiency, before being expanded to include student engagement and marking. This case study examines the challenges and opportunities encountered by BPSFC as it navigated the complexities of AI implementation. The college's experience provides insights into the ethical, practical and pedagogical considerations relevant to other educational institutions considering adopting AI technologies.

Implementation

BPSFC implemented a phased approach to AI integration. Initial efforts focused on business functions, before addressing teaching and learning solutions. The college made Barton AI (its own front end to a large language model or LLM) available to staff and has begun to pilot access for students. The college also established an AI working group. The college recognised the importance of red-teaming AI agents (which will be explained in more detail in this article), and began to trial Barton AI with first-year EPQ (Extended Project Qualification) students and students from selected tutor groups. ›

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Background and initial exploration

BPSFC recognised the potential of AI to enhance efficiency, automate routine tasks and solve complex problems early. The college's senior leadership team met in January 2024 to discuss the implications of AI across the college, including business operations, cybersecurity, teaching and learning. An area of particular interest was its application to repetitive, high-error tasks and those with declining rates of productivity. BPSFC also felt that addressing these areas would enhance its ability to staff its support services – roles that were vulnerable to retention issues as a consequence of the private sector offering higher rates of pay for roles at the lower end of pay scales.

The college decided to first explore AI solutions for business functions; the rationale behind this decision was that tasks across the business services teams were repetitive tasks (which often had decreasing productivity rates, with increasing error rates) and as such presented 'quicker wins'. The goals included reducing staff workload, improving staff and student experience, and ensuring value for money.

BPSFC began to explore the market for external consultants to help it deliver the project and achieve its aims. It engaged with 13 specialist companies to conduct 'deep dives' into their business functions, before finally settling on two external companies; both were appointed to explore AI-based solutions. The first focused on creating bespoke 'AI agents' by adapting existing AI tools. The second examined 'Google-based' solutions, including moving systems to Google Cloud and piloting Google Gemini across the entire college. Both companies carried out independent deep dives of the business services. This case study primarily focuses on the first deep dive and the subsequent creation of bespoke agents. The deep dive revealed 107 functions where AI could make a strong impact; these 107 functions could be delivered through the creation of 26 bespoke agents.

Development of AI agents

Through its partnership with the external consultant, BPSFC began developing a range of AI agents, including:

- **Barton AI:** This is a bespoke front end to an LLM, built within the college's Google tenancy, which allows the college to implement its own safeguards and prompts to prevent misuse and bias. This also eliminates the need for costly monthly licences, while ensuring GDPR compliance. For example, staff can put class sets of data into the LLM for analysis, while ensuring that the sensitive data never leaves the college's digital domain and that it isn't used to train any external models.
- **Barton Buddy:** This is a digital assistant for students, providing information and guidance from a range of sources. These include Google Classroom, Sites, Docs, Slides, Gmail, Workspace and more, as well as API (application programming interface) to the management information system (MIS) and the local bus company's live bus data. This agent performs as a 'one stop shop' for students, offering 24/7 guidance on college life, including low-level health and wellbeing support, signposting students to immediate internal and external support.
- **Peveril Assistant:** This is a digital assistant for staff, just like Barton Buddy for students, providing information and guidance from a range of sources. These include policies, procedures, the college's infrastructure and more. Peveril Assistant also includes the API access to the MIS.

BPSFC has developed 19 agents in total, to improve efficiency, reduce human error and address repetitive tasks. These include agents to enhance the enrolment process (like a GCSE results agent, which pre-populates the MIS before being reviewed by a human), a marking tool that provides both student feedback and a mark, and a certificate agent that cross-checks details on the exam board certificate with those in the MIS.

By May 2024, eight AI agents were ready to be demonstrated to staff. All agents built for BPSFC are fully tested in a 'sandbox' site (a testing environment that is isolated from a live system, allowing users or developers to experiment, test new features or practise without affecting the actual operational environment) by staff and students selected to be part of the 'red team'. The aim of red-teaming agents is to find flaws and vulnerabilities in an AI system. This is done in a controlled environment (the sandbox site) in collaboration with the AI's developers. Each agent is 'red-teamed' for a period of weeks until the college and developers are happy with the performance of each agent.

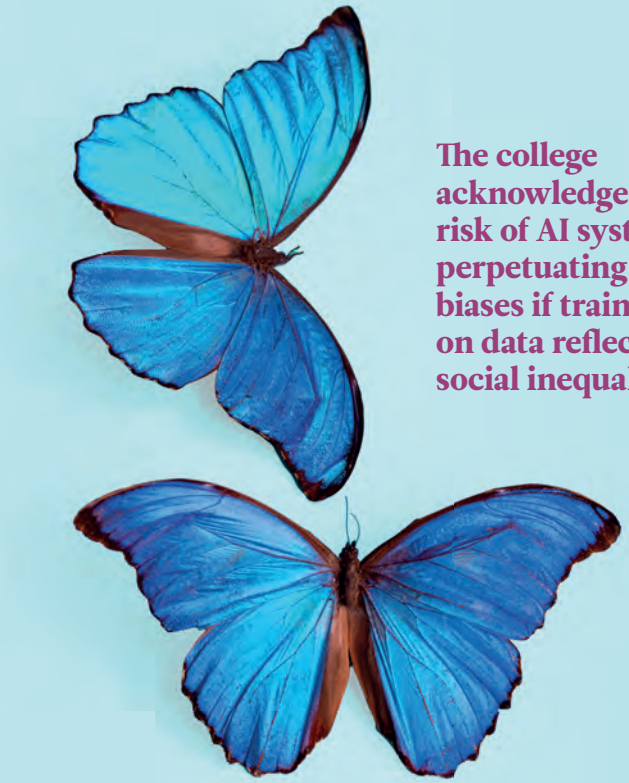
Challenges and risks

Like all who embrace this new technology, BPSFC faced several challenges and risks within its AI implementation, which the college recognised and addressed proactively:

- **Ethical considerations:**
  - **Bias and fairness:** The college acknowledged the risk of AI systems perpetuating biases if trained on data reflecting social inequalities. This was addressed by building all agents within its own Google tenancy so that it could implement its own constraints and prompts to try to avoid misuse and bias. One such control implemented was the '100% accuracy' prompt built into the front, meaning that if the agent

is not certain of the output being correct, it does not offer a response. Instead, it is programmed to reply 'I do not have the accuracy to help with that question'.

- **Digital equity:** The college noted that not all students had equal access to AI tools, potentially widening the digital divide. This was addressed by developing both Barton Buddy and Barton AI as resources to be made available to all students free of charge. As both agents run on API access to an LLM, the necessity for individual licences is removed, replaced instead by much smaller 'token' costs, charged for what has been used.
- **Consent:** Most of the API access to LLMs requires parental consent for users under the age of 18. This presents a challenge in terms of addressing parental concerns around the use of AI and then recording consent in a way that grants access to the relevant agents. The often negative media coverage about the misuse of AI and the potential risks around data security cause parental concerns, which can be compounded by a broader lack of understanding of what generative AI (GenAI) is and how it works. These needed to be addressed through clear communications with explanations. BPSFC set up an ai@ email address so parents can ask questions that they would like clarified.
- **AI literacy:** Many students believe that all AI applications are LLMs. It was only through launching Barton Buddy to students that it became clear that many young people did not understand what GenAI is. Most users thought that Barton Buddy was itself an LLM, with access to the internet (despite it being made clear that it couldn't do that). Applications such as Snapchat AI and, more recently, Meta AI, both of which are LLMs, helped to compound the confusion.
- **Transparency and accountability:** The college recognised the potential for a lack of transparency due to 'black box' AI algorithms and the importance of establishing clear lines of responsibility. (Black box AI algorithms are AI systems where the internal workings are hidden or not easily understood, even by the developers who created them. They make decisions using complex processes that are difficult to interpret or explain.) By developing its own agents and implementing additional safeguards and controls, BPSFC was able to mitigate this risk. In addition, unlike commercial LLMs and tools, all BPSFC tools record the input (question asked) and, more importantly, the output (answer given), providing transparency.



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The college acknowledged the risk of AI systems perpetuating biases if trained on data reflecting social inequalities

- **Data privacy and security:**
  - The college noted that AI systems require access to personal data, and thus the need to ensure the security of that data. BPSFC ensured that AI tools used with college data adhere to GDPR standards, including conducting data protection impact assessments where appropriate and training staff on data safety.
  - Barton AI was designed not to produce images or videos, to further restrict potential misuse.
- **Pedagogical concerns:**
  - The college acknowledged the possibility of over-reliance on AI, which could reduce critical thinking, problem-solving skills and teacher autonomy. The college put in place guidance and training for staff and students on the use of AI, and encouraged AI use as a starting point and not a finished product. The guidance was developed in- ›

house, using the knowledge of key staff and external stakeholders such as the developers and TechUK.
    - BPSFC understood that AI could impact the student–teacher relationship by reducing human interaction and affecting social and emotional development. The college emphasised that AI should not replace human guidance and interaction, but enhance it by 'freeing up' more time for staff to offer human support.
- **Practical challenges:**
    - The college was aware of the costs associated with implementing AI solutions, including licensing, training and infrastructure.
    - The college also recognised that some areas, such as timetabling, were more complex to automate and required bespoke AI solutions.

Opportunities and benefits

Despite the challenges, BPSFC recognised several opportunities and benefits of using AI in education:

- **Enhanced efficiency and reduced workload:** AI agents such as the GCSE Results Agent and Certificate AI have significantly reduced the time spent on manual tasks. For example, the GCSE Results Agent saved 93 labour hours during enrolment, and Certificate AI saved 300 labour hours annually.

- **Improved student experience:** AI tools such as Barton Buddy provide students with easy access to information, including timetables, attendance and grades. The college has also used AI tools such as its marking tool (or the commercial tool Brisk) to provide tailored explanations, feedback and resources, helping students to grasp complex concepts and improve their understanding.
- **Enhanced teaching practice:** Staff have access to tools such as Brisk and the BPSFC marking tool to enhance teaching and learning. AI tools have also supported the development of revision skills and retrieval practice. The college is using AI tools to create resources (through Google Gemini and Google Gems) and to provide student feedback.
- **Digital literacy:** BPSFC has developed resources so that students are being educated on what GenAI is, how to use and evaluate AI technologies, and how to understand their ethical implications and limitations. It is working with external stakeholders to develop 'AI driving licences' for students: a 'provisional licence' that covers the very basics and a full licence that is far more comprehensive in its content.
- **Future readiness:** Students are developing digital literacy and skills essential for the future workplace, where AI will play an increasingly important role. BPSFC has become the first UK 'Gemini AI Academy', providing staff with regular access to training and with all staff having a premium Google Gemini account.
- **Accessibility and inclusion:** By providing an LLM, the college aims to ensure that all students can benefit from these technologies and reduce the digital divide. In addition, the agents are developed to be multilingual, with a voice-to-text function and both light and dark mode, to support the accessibility of the tools to a wide audience.

Students are developing digital literacy and skills essential for the future workplace, where AI will play an increasingly important role

BPSFC held 'AI inset days' in June and November, providing training and development to staff on how to use GenAI both in and out of the classroom. In addition, there have been regular optional training sessions for staff to attend as part of their continuous professional development, exploring the use of tools such as Gemini, Gems and Notebook LM; these sessions have regularly been oversubscribed.

Conclusion

BPSFC's journey with AI provides a valuable case study for other educational institutions exploring AI integration. The college's approach has been proactive and considered, balancing the opportunities and benefits with ethical and practical challenges. By embracing a responsible and iterative approach to AI, Barton Peveril is positioning itself to provide a more personalised, efficient and future-ready educational experience for its students, and is contributing to the understanding of how AI may be integrated into the educational landscape.

Next steps

Following the successful development and integration of their agents, BPSFC is now focusing on further developing their marking tool to reduce teacher workload and improve marking standardisation. They have also commissioned the development of a new agent to reduce the administration burden around SEND, which will be red teamed in the spring term and go live in September 2025.

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How AI can be a panacea for the growing SEND, workload and retention crisis

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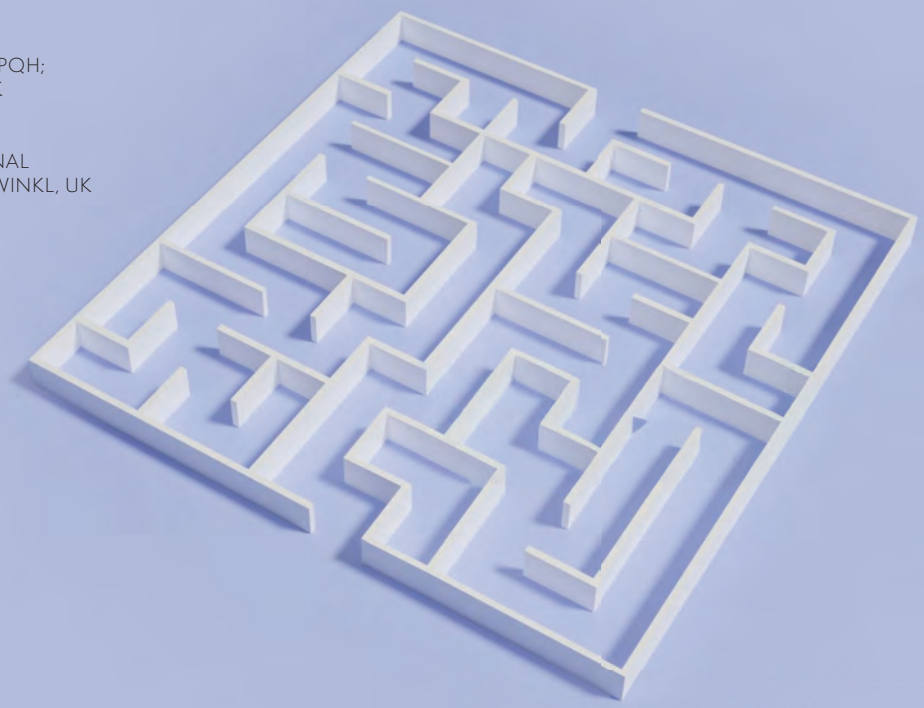

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Lost amid the noise of the election, the Department for Education (DfE) updated its risk report in July to warn that the SEND (special educational needs and disabilities) system was 'very likely' to become financially unsustainable (DfE, 2024). Despite funding increases (IFS, 2024), with a rising number of pupils with SEND and Ofsted pushing to close the attainment gap that widened during the pandemic (Stanley and Owston, 2024), educators are under mounting pressure; 85 per cent report that 'SEND pupils are not receiving adequate support' (Teach First, 2024).

A recent poll conducted by Twinkl *SEND Digest* (Brown, 2024) found that educators are facing a ticking SEND time bomb of growing demands and shrinking resources, contributing not only to the widening attainment gap but also to the workload and retention crisis – 78 per cent of SENDCos (SEND coordinators) surveyed report that they have resigned or are considering doing so.

With limited fiscal levers to pull and long wait times for external services, government and education leaders need to prioritise EdTech (educational technology), and AI in particular, in their strategies to reduce workloads and improve outcomes.

Drawing on the research of the National Literacy Trust (2024), Education Policy Institute (2024), National Foundation for Educational Research/Education Endowment Foundation (EFF) (2024) and the DfE and National Audit Office (Davies, 2024), this article offers practical solutions on AI best practice to support SEND learners, while reducing workload for educators.

AI and EdTech can provide useful tools for SEND practitioners and teachers as they face these growing challenges. However, as experienced SENDCo and author Georgina Durrant advocates, it is critical to remember that AI should never be seen as a replacement for human expertise. Like many technological advances before it, AI can be a powerful tool to support the teaching and learning of children with SEND, but it is crucial that teachers use AI to assist, not replace, their expertise. Teachers' ›

professional judgment and deep understanding of individual learners' unique needs are irreplaceable.

We need to ensure that we position teachers as the experts and use AI as a supplementary tool, enhancing teaching while ensuring that teachers' experience and intuition remain at the forefront.

A whole-school approach

Despite government backing for AI use in education (DfE, 2023), and with 75.3 per cent of educators (National Literacy Trust, 2024) recognising AI's potential to reduce workloads and improve student outcomes, two major factors are hindering the evolution of AI within schools:

- A lack of training and support: three in four (75.3 per cent) teachers said that they also need more training, ICT support and resources in order to use generative AI tools effectively (National Literacy Trust, 2024)
- Limited access to technology: Despite progress made during COVID, nearly half of schools (46 per cent) do not have reliable Wi-Fi access across their school, and a quarter of teachers do not have access to a school-owned device (tablet or laptop) that they can use at home for school work (Teacher Tapp, 2024).

Addressing the digital divide to improve outcomes, particularly those of the most disadvantaged (House of Lords, 2023), is not something that educators can tackle alone. The government, schools and trusts must ensure that all schools have access to high-speed internet (DfE, DDCMS and Zahawi, 2022) and relevant technology.

In terms of tackling educators' skills and knowledge gaps, given the nature of technological evolution and its rapid advance, leaders should consider adopting a collaborative inquiry approach (Sharratt and Fullan, 2012) to empower educators in their settings. This will help to underpin all areas of school improvement with AI/EdTech best practice (DfE, 2023), without unnecessarily increasing workload – as opposed to approaching AI/EdTech as a standalone strategy or add-on.

Applying the collaborative inquiry model

As with any whole-school change strategy, there are three factors to prioritise for success:

- motivation (Warner Burke and Litwin, 1992)
- adequate implementation and reflection time (Sharratt and Fullan, 2012)
- the provision of ongoing, effective training, support and leadership (Leithwood and Riehl, 2003).

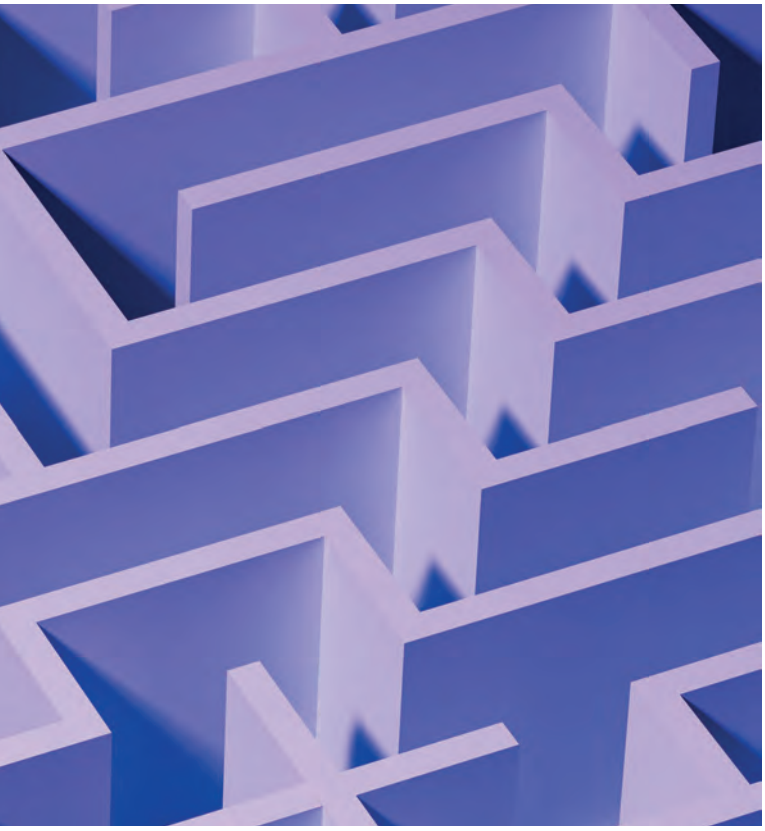
We need to ensure that we position teachers as the experts and use AI as a supplementary tool

In terms of motivation, the first step to setting up a successful whole-school and/or trust collaborative inquiry model is establishing a meaningful inquiry question, linked to improving student outcomes, such as: How can AI be used in your area to improve outcomes for SEND learners?

It is then critical to allocate adequate time for research, discussion, relevant training, sharing of good practice (across the school or trust, in person or online), implementation, collaborative feedback and reflection (Sharratt and Fullan, 2012).

Supporting your team

As AI is a relatively new technology, a best practice landing page or online classroom is a great way to empower educators by ensuring that they have instant access to the CPD (continuing professional development) that they need. An online hub can include short 'how to' videos that clearly demonstrate the use of the tools, relevant safeguarding information, links to interesting research, relevant longer-form CPD and a 'wow wall' where people can share their AI wins.



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Using AI today to improve outcomes for SEND and reduce educator workload

Since the introduction of the revamped curriculum in 2014 and the shift to a curriculum-focused Ofsted inspection framework in 2019, teachers, pupils and parents have reported increased workload (Churches and Fitzpatrick, 2023) and higher stress levels (BACP, 2023).

As E-ACT CEO Tom Campbell (2024) asserts, the effect of curriculum overcrowding goes beyond workload and wellbeing – it also affects outcomes, particularly those of the most vulnerable and disadvantaged.

Expanding on this, Georgina Durrant describes how we are not meeting the needs of many learners with SEND through the current curriculum and assessment model. The curriculum is too narrow to allow all pupils to thrive, and academic pressures are often barriers to success. Children and young people deserve an inclusive education with a curriculum that allows for all to succeed.

The solution, as Durrant and Twinkl AI Lead Jonathan Park assert, is adaptive teaching and personalised learning. However, as current workload statistics show (Churches and Fitzpatrick, 2023), finding the time to do this with more than 30 children in every class, at a point when educators are already overstretched, is easier said than done.

Here, as research from the Education Endowment Foundation (EEF, 2024) and the National Literacy Trust (2024) shows, is where AI can help.

What tools are working?

As outlined by the National Literacy Trust (2024), the percentage of educators who said that they had used AI increased from 31 per cent in 2023 to 47.7 per cent in 2024, in the following ways:

- 56 per cent for ideas
- 50 per cent to ask questions
- 37.8 per cent to create lesson content
- 34.7 per cent to generate model answers
- 32.4 per cent for lesson planning
- 26.7 per cent to make quizzes
- 26.7 per cent to differentiate content
- 10.4 per cent to translate text
- 4.7 per cent to assess work.

As the EEF summarises, this could help educators to reduce their lesson planning time by 31 per cent (EEF, 2024).

Explaining in more detail how AI can be used to support SEND learners, Jonathan Park suggests using AI for the following areas.

Adaptation of content for inclusion needs

Many teaching resources, particularly historic content, have not been designed with inclusion in mind. Moreover, the needs of children may often be highly individual, frustrating attempts to find resources that meet that need. Traditionally, teachers and educators have had to tailor this content themselves – a time-consuming process in a time-poor environment. AI and EdTech can play a major role in adapting content quickly, modifying resources to make them more accessible.

Personalised content to engage learners

Student engagement is 'critical for successful learning' (Wang and Degol, 2014, p. 137), and this is particularly true for some children with SEND. AI can be used to rewrite tasks to tailor them to the child's specific interests, or to create reading comprehension activities focused on topics that excite the child, without teachers needing to spend time creating the resources themselves (National Literacy Trust, 2024).

Help and advice

Large language models (LLMs) have been trained on large amounts of text, including many discussions of SEND issues. As such, they can offer ideas and suggestions for how best to adapt content or a lesson for a child's needs. However, caution is needed in this area. AI tools can't match the expertise of the classroom practitioner or SEND expert, and should only be used by trained professionals who can use them to spark thoughts on good adaptation. ›

What the future could look like

Predicting the future is always problematic, especially in AI, where technology can change quickly. However, looking at AI and machine learning trends, there are developments that could shape the future of SEND teaching in the next 12 months, especially in the field of specific SEND-trained models.

Most AI tools for SEND work either through prompt engineering on an LLM or, increasingly, through retrieval augment generation (RAG), where an LLM is required to reference an authoritative knowledge base beyond its training data sources, before it creates a response. Over the next 12 months, as greater steps are taken in fine-tuning, RAG and even purpose-built domain-specific models, the expertise and accuracy of AI models' outputs will likely increase for SEND purposes.

However, as Jonathan Park asserts, AI is not an expert. LLMs respond based on the content on which they've been trained, which is not always drawn from knowledgeable sources. Think of it as a sounding board – good for ideas and getting a start but, ultimately, you're the expert in your profession and your classroom.

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Harnessing artificial intelligence to transform CPD and reduce educator workload in sixth-form colleges

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In the fast-paced and demanding environment of an Ofsted-outstanding sixth-form college, educators face increasing pressure to balance high-quality teaching with administrative duties. The integration of AI presents a promising solution to alleviate these burdens, enabling educators to focus on their core role of facilitating student learning. This article explores the transformative effect of AI in reducing workload for teaching and support staff, focusing on its application in continuing professional development (CPD) sessions. Drawing on two years of practical experience and important research insights, this case study demonstrates how AI can be leveraged to reduce workload while maintaining educational excellence. ›

Context and aims

AI implementation in CPD was driven by the aim of enhancing teaching quality and improving teacher wellbeing. The NASUWT (2024), in its 'Wellbeing survey briefing', revealed that '54% of teachers say that workload... has been the main factor for increased work-related stress' (p. 1). The NEU (2024) found in a survey of more than 8,000 NEU members that 'two in five (41%) describe their workload as "unmanageable" and 37% "only just manageable"'.

The objective of the AI-focused CPD initiative was to introduce practical, accessible tools that could:

- reduce time spent on routine tasks
- enhance the quality of teaching
- foster a culture of experimentation and collaboration.

In the Department for Education's report 'Generative AI in education' (Open Innovation Team and DfE, 2024), it was found that 'teachers and experts acknowledge that GenAI could have a transformative impact on education. From helping teachers save time by automating tasks, to improving teaching effectiveness by personalising learning for students.' (p. 4) The Education Endowment Foundation (Baxter, 2024) published a report claiming that 'teachers using ChatGPT, alongside a guide to support them to use it effectively, can reduce their lesson planning time by 31 per cent'. This, along with my own workload and a lack of 'joy' in some of my teaching, led me to think about how to move forwards with new technologies.

CPD session overview

Over two years, I have delivered several CPD sessions on technology (SharePoint, OneDrive, MS Teams) and AI. A recent session, designed using AI tools, in which I used very specific prompts, showcased how tools such as ChatGPT, Microsoft Copilot and Prezi could be integrated into daily teaching practice. The session was created using very specific prompts in AI and then adapted to cover:

1. **Automating lesson planning:** Teachers explored how ChatGPT could generate detailed lesson plans, adaptive teaching activities, practical activities and extension tasks in less than 10 minutes. For example, a prompt asking for a lesson plan on Stanislavsky's acting methods produced a detailed structure, complete with important discussion points, suggested activities and assessment questions.
2. **Creating rubrics and model answers:** AI tools were demonstrated to produce clear, standards-aligned rubrics for assessments. Staff saw how these tools could generate high-quality model answers tailored to different levels, which not only saved time but also supported consistent marking.
3. **Developing lesson presentations:** Using Prezi, teachers created visually engaging and interactive presentations in minutes. By entering a lesson's objectives and keywords, AI could produce an editable presentation, significantly reducing preparation time.
4. **Streamlining administrative tasks:** Staff were introduced to Microsoft Copilot, which automated tasks such as drafting letters to parents, replying to emails and creating risk assessments. For example, a risk assessment template was completed in under five minutes with minimal manual input.

Staff were able to use modelled examples in their own way by using computers in the CPD session, which allowed for easier 'buy-in', as they could see the AI tools working there and then. Models and prompts, which I had been developing over two years to create my own resources, were provided to staff.

Application in practice

After gleaning information from seminal texts such as Winnick's *The Generative Age* (2023), Clark's *The AI Infused Classroom* (2023) and Meyersieck's *AI in Education* (2023), I decided to undertake some uses of AI myself and to begin to design prompts and materials that would be useful in teaching, learning and assessment, as well as in day-to-day teacher life.

We began with scheme of work automation, looking at BTEC units for the BTEC National Extended Certificate in Performance. I was able to show that by using the exam board specification, it is possible to map the skills and activities needed for the unit being covered. Produced as a table, it was broken down into week and lesson number, teacher and student activities, assessment, specification links and resources needed. I was then able to show staff how to copy a lesson from the scheme of work back to ChatGPT to produce the detailed lesson plan and the resources, such as worksheets, quizzes, assessment sheets

and so on. I was able to show staff how ChatGPT can even produce a lesson script for those issues that staff may not be sure about how to deliver – this was done for a lesson on Stanislavsky's acting techniques and for demonstrating how the Alexander Technique is used in an actor's preparation.

I was able to show demonstrations of worksheets, such as a handout on camera angles for film and TV, and how ChatGPT had produced a short film script for students to practise the camera angles, giving details on which angle to use at which stage. This was tailored to the actors in the class.

Another good demonstration was the use of ChatGPT and Microsoft Copilot to remove administrative and research tasks, such as finding examples of playscripts to use with the specific class that I teach and to produce a tailored risk assessment for a trip. I even produced an agenda for a faculty meeting to show how ChatGPT/Copilot can be used to assist as a middle leader.

Prezi is a new addition to my AI toolbox this year. I had used Prezi many years ago, when I was training as a teacher, but found that it had now added an AI feature. I demonstrated how, by adding key words, AI prompts, specification information, topics and so on, Prezi will produce an editable presentation that is visually pleasing but also contains the content for a lesson. At £4 per month, this is saving so much time in producing lesson presentations and including very good content – especially helpful where the output needed is mainly factual. These facts are included (while, of course, being checked and sometimes adapted), for example, within presentations on the periods of music for A-level music sessions.

Prompt examples

Scheme of work planning

Generate a three-week A-level scheme of work for students aged 16–18 as a table. The table should have columns for 'week number', 'lesson number', 'objectives', 'teacher activities', 'learner activities', 'assessment', 'timing' and 'assessment objectives'. Each week should have three lessons in a sequence of one lesson of 100 minutes, one lesson of 75 minutes and one lesson of 100 minutes.

Here are the assessment objectives of the scheme of work: Learners must present a detailed and comprehensive account, showing a thorough and informed understanding of the role of the professional performer. They should evaluate the various technical, practical, employability and personal skills required, and how the performer may secure employment and achieve longevity through effective skills and professional development. Learners will evaluate training and qualification routes in terms of their appropriateness and viability, and their work will draw conclusions about the effect of working patterns and lifestyle factors on the performer's career. Learners' conclusions will be well argued and supported by well-chosen examples. Their work will be presented to a high standard, with effective use of subject-specific terminology, relevant presentation techniques – for example, practical demonstrations – and good use of grammar.

Include the exact assessment objectives I provided in the assessment objectives column for each corresponding part of the lesson. In the timing column, include the amount of time that should be spent on that part of the lesson.

Lesson planning

Here is a set of prompts that I used within a ChatGPT conversation to create the lesson plan and the resources needed:

1. *You are delivering sessions to 16- to 18-year-old BTEC acting students. The session is 100 minutes long. They are studying Unit 17 Screen Acting from the BTEC Level 3 National* ›

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Extended Certificate in Performance. The students are doing skills-building workshops and need to complete a practical project through the 100-minute session. The students need to cover skills for realistic film acting. You must put together a task sheet for the students to follow for a 100-minute session.

2. *Can you create a handout with the key skills and techniques needed for realistic screen acting?*
3. *Can you create a plotline and storyboard idea for a realistic film exercise?*

Challenges and considerations

While the benefits of AI are clear, its integration is not without challenges:

1. **Initial learning curve:** Some staff found the tools intimidating at first, necessitating additional training and support.
2. **Ethical concerns:** Ensuring that AI outputs are accurate, unbiased and aligned with curriculum standards requires vigilance. AI is not completely accurate and should always be checked. One must also check the bias that AI has encountered and that the output fits what is needed. AI picks up on various curriculums and standards – these need to be checked with exam boards, school curriculums, the National Curriculum and so on, to ensure that what is created is fit for purpose.
3. **Access and equity:** Not all educators have access to high-quality AI tools, which could exacerbate existing disparities in resources.

Practical recommendations

For institutions looking to replicate this approach, the following steps are recommended:

1. **Start small:** Introduce one or two AI tools in targeted CPD sessions, focusing on their most effective applications.
2. **Provide ongoing support:** Offer follow-up workshops, drop-in sessions and a shared resource hub to support staff. In our case, this was a SharePoint page and an MS Teams channel, which we share for those who are interested.
3. **Encourage experimentation:** Foster a culture where staff feel comfortable experimenting with AI tools and sharing their experiences. This is important for both the things that went well and those that didn't.
4. **Evaluate impact:** Use staff surveys and workload audits to measure the tangible benefits of AI integration and refine the approach as needed.

Conclusion

Integrating AI into CPD sessions could revolutionise workload management in sixth-form colleges. By automating routine tasks, enhancing resource quality and fostering collaboration, AI empowers educators to focus on what matters most: teaching and learning. As this case study demonstrates, with careful implementation and support, AI can be a powerful ally in driving educational excellence and improving teacher wellbeing.

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AI IN CURRICULUM AND ASSESSMENT AT UNITED LEARNING: MAXIMISING IMPACT, MINIMISING RISK

AI for schools: Unlocking potential in curriculum processes

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Generative AI (GenAI) could fundamentally change education and substantially support teachers in teaching, and its use in education is growing. The proportion of teachers reporting that they are using GenAI 'to help with school work' grew from 35 per cent in August 2023 to 42 per cent in November 2023 (Teacher Tapp, 2023) and to 57 per cent in August 2024 (Teacher Tapp, 2024).

The ways in which teachers might use GenAI 'to help with school work' are varied, from drafting policies to communicating with parents. However, as of April 2023, the most common-use cases were 'creating lessons/curriculum resources' (reported by 62 per cent of teachers surveyed) and 'planning lessons/curriculum content' (42 per cent) (DfE, 2024a).

These figures may be a result of – or have resulted in – a parallel growth in the number of GenAI tools that aim to support teachers with curriculum- and lesson-based tasks. These include tools that create resources, lesson plans and unit plans, and even tools that generate end points. However, without a common understanding of GenAI's role in curriculum processes, the use of these tools is limited and could, perhaps, be detrimental.

This article will set out a model for effective (and ineffective) GenAI use in curriculum processes, and consider how we may need to change the way in which we store curriculum information to fully unlock the potential of GenAI in this aspect of teachers' work.

1. Effective use of GenAI in curriculum processes

In describing the use of GenAI, different reports will use terms such as 'planning' and 'resourcing' differently; it is important to be clear about what we mean when using these terms.

Figure 1 shows a simple model of core curriculum processes for the purposes of this article. It is limited: it does not include consideration of pedagogical approaches, nor the formative assessment of pupils' understanding and subsequent planning and preparation to fill gaps in knowledge. This is not because these are not integral aspects of teachers' work, but because the role of GenAI in these areas would require separate articles and cannot be considered here. (Formative assessment and planning gap-filling tasks were the subject of the technical proof of concept in a hackathon commissioned by the Department for Education, published in October 2024 (DfE, 2024b).)

Broadly, we should consider planning as the consideration of what content will be taught and how this will be carefully sequenced to enable pupils ›

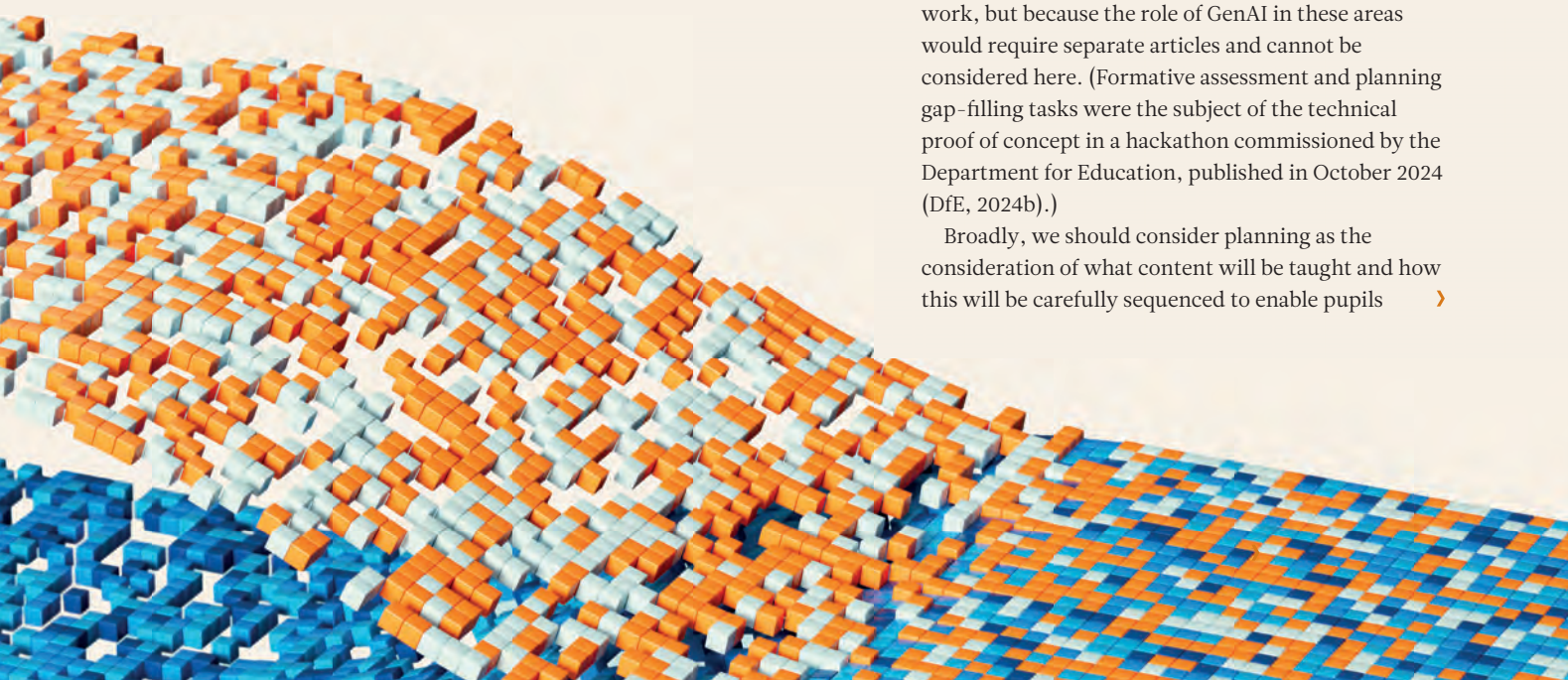

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FIGURE 1: **A SIMPLE MODEL OF CORE CURRICULUM PROCESSES**

to develop their schemas over time. Long-term curriculum design includes an articulation of the major concepts that should be developed in a subject (and across subjects) over a long period – typically years and key stages. Medium-term planning includes the sequencing of content over a series of lessons or a unit, and short-term lesson planning includes decisions about how an individual lesson will build in small steps, and how individual pupils may need to be supported with scaffolds or other structures. Planning needs to happen in this order: it is not possible to develop a lesson outline without a clear understanding of where that content will sit in the medium- and long-term curriculum sequence.

Only once all the stages of this planning are complete can teachers turn to preparation – creating resources that will enable teachers to deliver the lesson itself. This may include writing appropriate texts for students to read, locating historical sources, writing questions, translating texts and writing model answers. These resources are typically created for specific purposes and designed according to the parameters of the lesson outline.

GenAI is currently most useful and effective in short-term lesson resourcing. With specific prompts, teachers can use readily available tools to create specific diagrams, texts and translations. With a lesson outline in mind, teachers can generate resources to a clear brief. Research commissioned by the DfE showed that using GenAI for 'generating lesson materials' saved time, met national standards and improved outcomes, and the participants involved in the research said that they would be likely to use it for this purpose (DfE, 2024c).

The sector should seriously consider how GenAI could play a role in long-term curriculum design, if at all – both now and in the future. At its core, this involves making decisions about what we choose to teach pupils and what we as a society and in our schools agree is the 'powerful knowledge' that will enable pupils to think and act more powerfully in their lives (Young et al., 2014). Delegating this task to GenAI – widely known to generate content that can be inaccurate, inappropriate, biased, taken out of context, out of date or unreliable (DfE, 2023) – does not sit comfortably. We should also be mindful that most GenAI tools have been created in the US, so are not typically tailored for educators in the UK or England. Tools such as an 'endpoint generator' should therefore be used with caution, if at all.

Many tools are currently available for other stages of planning – the medium-term outlines and short-term lesson outlines – notably the DfE-funded Oak Academy's Aila. Like many other tools, this aims to enable teachers to 'build a tailor-made lesson plan and resources in minutes' (Oak National Academy, 2025). However, DfE-commissioned research shows that teachers did not feel that using GenAI for 'generating age-appropriate lesson plans' resulted in usable resources that would improve outcomes (DfE, 2024c, p. 22).

This is not surprising. Many GenAI tools available to teachers promote a focus on generating a short-term lesson outline, in isolation from the long-term curriculum design and medium-term outlines. GenAI tools in their current format – not trained on any one coherent curriculum sequence – cannot generate a lesson that will sufficiently build on prior learning, use appropriate vocabulary and achieve the objectives of a lesson in appropriately sized steps.

2. Maximising the impact of GenAI

In their current format, GenAI tools cannot generate medium-term and short-term lesson outlines as effectively as teachers. Teachers know what has been taught previously, how knowledge will build in the future, and the specific outcomes that need to be mastered to enable pupils to progress in the wider curriculum sequence. GenAI does not have this contextual curriculum information, so can

only generate a generic lesson outline based on the information on which it has been trained.

United Learning has been experimenting with how we can give GenAI the contextual curriculum knowledge that it needs in order to improve the quality and relevance of what it can generate.

Providing this curriculum information is not straightforward, for two reasons. The first is the practical question of how to feasibly collate and store all the information in a given curriculum in one place, from the progression in important concepts, to specific vocabulary and definitions, to the ways in which pupils might be expected to apply their knowledge in different contexts. The second challenge is how to give this information to a GenAI tool safely. Often, anything uploaded to a tool will be incorporated into its broader training dataset and used to further train the model. This has implications for the quality of the tool's outputs: if lots of inaccurate or ineffective items from different sources are incorporated into the dataset, the tool will learn from them and subsequently generate increasingly inaccurate or ineffective outputs. It also has implications for the owner of the intellectual property (IP) of the curriculum (typically the school or trust in which they were created), which loses exclusivity.

Our early experiments have aimed to overcome these two challenges. To collate and store curriculum information, we have taken all our content and sequencing information that currently sits in Microsoft PowerPoints, Word documents and Excel files, and stored it all as a Microsoft Azure Blob (binary large object). This is a folder-like structure that allows us to store files with useful 'tags' (metadata) such as phase, subject, topic, key stage and so on. From there, we can extract all the core content contained within the files and create a single Azure Search Index. This is a large single library of curriculum information with associated metadata, with which a GenAI tool can interact.

To overcome the second challenge and ensure that this curriculum information is safe, we have limited our use of GenAI to Microsoft's Azure OpenAI service. This is secure; the service does not share data with other sources or tools, or use our information to further train its model.

These early experiments have shown that it is possible to generate outputs that are aligned with a specific curriculum sequence. For example, if asked 'What do pupils learn about river processes in Year 7?', it can give accurate information about the specific vocabulary used, the specific features included and, when prompted, how this will build in the future – a significant improvement on the responses of the widely available generic tools.

Larger education institutions, multi-academy trusts and EdTech companies are likely to have more technical expertise and capacity to conduct experiments like this. To enable all schools to harness the potential of GenAI in curriculum processes, we need a more scalable way of enabling individual schools to store and use their curriculum information. This is a longer-term goal and a challenge for the sector as a whole, which will require collaboration between educators and those with more technical expertise.

In the meantime, we should not stop setting out our expectations for GenAI and where it can and cannot help us in curriculum processes. By defining our expectations and collaborating as a sector, we can ensure that GenAI tools enhance, rather than dictate, our approach to curriculum processes.

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AI IN CURRICULUM AND ASSESSMENT AT UNITED LEARNING: MAXIMISING IMPACT, MINIMISING RISK

AI in assessment: Managing risks and seizing opportunities

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Assessment is integral to education, helping us to understand how students are progressing. Whether formal annual tests, exit-ticket quizzes or informal learning checks in the classroom, 'traditional' assessment isn't going away – but it is hugely impacted by AI, both positively and negatively.

United Learning's ongoing development of the United Curriculum and supporting assessments, for our schools and for those outside the group, requires us to consider how to manage the risks and take advantage of the opportunities presented by the advent of GenAI. This paper draws together our own experience with research and emerging innovative practice to explore how schools can safely use AI in assessment.

How AI is changing traditional assessment

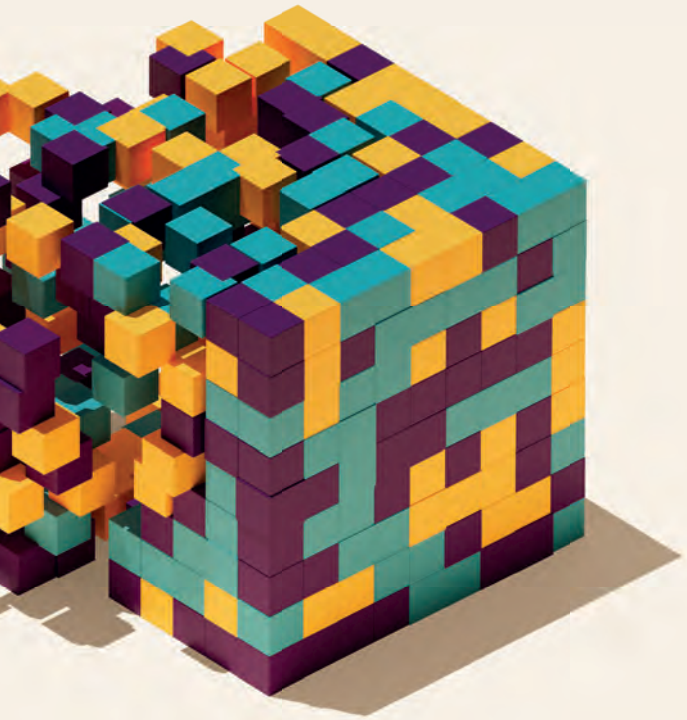
AI could reduce teacher workload while maintaining or improving assessment quality (Roy et al., 2024). GenAI can rapidly generate questions, texts or images to use in assessments, helping with workload or prompting a more creative way in which to assess a topic – for example, if a biology teacher asks ChatGPT to give them some innovative questions assessing students' knowledge of cells in unfamiliar contexts, it will happily oblige.

A plethora of tools already promise the 'silver bullet' of automated feedback and marking, reducing workload and enhancing impact by providing instant feedback and next steps for teachers and students. AI could also produce a range of exemplar responses to support more consistent marking, show students what good work looks like and demonstrate common mistakes and misconceptions.

Assessment generates huge amounts of data, which teachers spend a lot of time analysing. AI excels at identifying patterns and could provide automated question-level analysis, quickly spotting areas where students are struggling so that they can focus on the teaching rather than poring over the data. GenAI even offers the potential to skip marking altogether and directly analyse students' work to identify common errors and gaps – for example, an English teacher could upload students' essays and ask AI to formatively analyse the grammatical structures used in their work, to inform planning and interventions. (It is essential to ensure that students' data and IP are protected, as discussed later in this article.)

GenAI can provide quality assurance by reviewing assessment tasks for clarity, accessibility and potential bias. Teachers can input questions or tasks and receive feedback on reading-age appropriateness, cultural or linguistic bias, clarity of instructions and construct-irrelevant barriers that might prevent students from demonstrating their learning.

Differentiation and accessibility can be significantly enhanced using AI, which can help to create multiple versions of assessment tasks to meet



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Keeping a 'human in the loop' is critical to check the quality of anything generated by AI

different learning needs, while maintaining consistent learning objectives. This might include adjusting reading levels while maintaining subject complexity, breaking down complex tasks into manageable steps or suggesting accommodations for students with specific learning needs. AI for Education (2024a) has explored how to use GenAI tools to systematically review and modify an assessment to maximise accessibility and validity.

AI can support teachers, but not replace them

While there is significant scope for teachers to use GenAI to support them in producing high-quality assessments, there are risks involved in doing so, especially when using 'generalist' tools such as ChatGPT or Claude. Keeping a 'human in the loop' is critical to check the quality of anything generated by AI.

Teachers need to ensure that AI-generated questions are aligned with the curriculum, at the right level and assessing the right things, and that feedback is relevant and meaningful. AI can help to spot human bias, but it can have substantial biases of its own. It is well known that GenAI suffers from 'hallucinations' – its responses can contain factual errors or completely invented content – so any materials produced must be checked for factual inaccuracies. When using specialist educational tools that incorporate AI, teachers should critically evaluate the quality of the AI-powered provision and how well it aligns with their curriculum; meaningful and useful feedback needs to be consistent with the curriculum sequence and key knowledge, build on students' prior learning and highlight common misconceptions.

GenAI tools powered by large language models (LLMs) also tend to be more suited to language-based subjects and tasks. Developers are racing to build the mathematical and reasoning capabilities of their models, but generalist LLMs can still get confused by anything but the most basic maths problems.

Ethical practice

As with any technology, schools must consider data security, IP rights and safeguarding implications when implementing AI in assessment.

Policies should specify what can be shared and where, and how General Data Protection Regulation and other data protection requirements will be complied with. Schools should be particularly mindful of data security when handling pupil data, with anonymisation recommended for any analysis using GenAI tools. Different tools treat data differently, but it should always be assumed that anything shared with GenAI could be visible to the public unless schools are confident otherwise. A data protection impact assessment should be in place for any tools used.

Teachers should be mindful of IP considerations when uploading students' work or third party resources into AI tools. Schools should ensure that safeguarding policies cover AI use, and it is good practice to be transparent with parents about how AI is used. Developing students' AI literacy through the curriculum is crucial to ensure that they learn how to use AI tools safely.

Integrity, authenticity and malpractice

The advent of widely available (and free) GenAI tools means that schools face increasing difficulty in ensuring the authenticity and integrity of students' work. However, research from Stanford University suggests that the incidence of cheating has not increased since the advent of ChatGPT; rather, students who previously sought shortcuts are simply using different tools (Lee et al., 2024). ›

In formal non-exam assessment in regulated qualifications, students and schools must adapt to avoid committing malpractice, perhaps unintentionally.

The Joint Council for Qualifications (JCQ) places the burden firmly on teachers and schools to identify whether work is a student's own and to provide clear guidance on the use of AI tools in assessments. Its guidance highlights the importance of teaching students about AI use and misuse, what constitutes malpractice, how to reference AI usage and the importance of the candidate declaration certifying that the work is the student's own (JCQ, 2024). Schools also need robust procedures for checking work authenticity, including comparison with students' previous work, looking for 'telltale signs' of AI use and, potentially, discussing submissions with students.

JCQ also suggests that schools consider using AI detection tools. However, research has shown that such tools are unreliable (Perkins, Roe et al., 2024), a view recently supported by Ofqual's Chief Regulator (Bauckham, 2024); they can also demonstrate bias against non-native English speakers (Liang et al., 2023). A reasonable approach could eschew detection tools but ensure that the other proposed checks are robustly implemented.

While managing risks is crucial, banning AI use or failing to engage with it is not a viable option. Students must learn to use AI effectively and responsibly, as it will be an integral part of their future work lives. Good policies, practices and culture, as well as well-designed assessment tasks, can help schools to ameliorate the risks and make the most of the opportunities.

'AI-resistant' assessments

Outside of regulated qualifications, schools can develop AI-resistant assessments that are inherently difficult to complete using AI alone. Critical here is the importance of assessment tasks requiring cognitive engagement and reducing opportunities for plagiarism and cognitive offloading. Good assessment tasks might focus on process instead of product, or skills instead of content, and can be rooted in the student's specific experience so that GenAI cannot know the answer.

Examples of such assessment tasks might include student presentations with live Q&A sessions, group discussions where students must reference specific peer contributions, or project work based in personal experience or local context (AI for Education, 2024b). These are not just AI-resistant but could also be more valid and authentic assessments.

From 'open book' to 'open ChatGPT'

We may think of students using AI in assessment primarily as a risk, but it is also an opportunity to set more interesting and challenging tasks, assess higher-order skills and develop students' AI skills.

AI literacy is itself a skill to be developed and assessed. Students can learn to evaluate AI-generated content for accuracy and bias, compare AI-generated and human-written texts, and prompt AI tools effectively. This develops

While managing risks is crucial, banning AI use or failing to engage with it is not a viable option

critical thinking about AI's capabilities and limitations, while preparing students for future workplace demands.

Researcher-practitioners such as Kentz (2024) are experimenting with using AI to assess students' creativity, critical thinking and metacognition while developing their AI literacy. By asking students to use GenAI tools iteratively to respond to a task, and then reviewing the transcripts of students' interactions with the AI, teachers can assess not only how the student is using AI, but also how their thought process follows and responds to the dialogue with the AI tool. Evolving the 'open book' assessment into an 'open ChatGPT' assessment in this way could give teachers a window into their students' thinking that traditional assessment struggles to provide.

A framework for implementation

To realise these benefits while managing risks, schools need a structured approach to implementing AI in assessment. The AI Assessment Scale (Perkins, Furze et al., 2024) provides a framework for ethically integrating GenAI into assessment practices, recognising different levels of appropriate AI use depending on the assessment context and learning objectives.

When developing their policies for AI use in assessment, schools should consider how to create a space in which teachers feel safe and confident to begin low-stakes experimentation – what this author's colleague Lauren Thorpe refers to as 'bowling with the bumpers up'.

Important principles for implementation include:

- matching AI use to assessment stakes – experimenting with innovative approaches in low-stakes, formative contexts
- maintaining the teacher's central role in AI-supported assessment processes, especially assessment design and quality assurance
- ensuring transparency about AI use with all stakeholders, including parents
- developing students' AI literacy through the curriculum, with a particular focus on safe and ethical AI use
- prioritising data security, IP protection and safeguarding
- ensuring alignment with curriculum and pedagogical approaches.

Balancing challenges and opportunities

GenAI tools present both challenges and opportunities for assessment in education. Success lies not in preventing AI use but in harnessing its potential while managing risks effectively. This requires clear policies, professional development for staff and a willingness to experiment with new assessment approaches that develop students' AI literacy alongside traditional subject knowledge and skills.

By taking a balanced approach – neither ignoring AI nor allowing it to drive pedagogical decisions – schools can begin to safely experiment with using AI in assessment to realise its benefits. The focus should remain on valid assessment of learning, while preparing students for a future where AI will be an integral part of their working lives.

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AI in teacher professional development: The unnecessary and absolutely necessary cognitive load of developing as a teacher

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Introduction

As is true in most professions, teachers are increasingly outsourcing elements of their work to AI tooling. As AI capabilities continue to improve, it will become increasingly possible to rely on machines to do parts of our jobs for us. This could provide significant benefits – from reduced teacher workload to increased personalisation of learning experiences for pupils. However, this article will highlight a fundamental question about the use of AI that demands careful consideration. In a world where teachers and school leaders could outsource more and more thought to machines, what do we want to ensure that we are still thinking about? And, crucially, what implications does how we answer this first question have for how we train, educate and develop teachers?

Unnecessary vs necessary cognitive load

A foundational principle of cognitive science is that (with some exceptions) to learn a new thing, we must think about it first. To successfully store something new in our long-term memory, we must first pay attention to new information from our surroundings and then process it using our working memory (EEF, 2021a). This mental effort to grapple with new information is often called 'cognitive load' (Neelen and Kirschner, 2020, p. 216). Thinking about new things is hard work, and a person's working memory can only handle so much new information at once before it becomes overloaded (Weston and Clay, 2018).

In education, one common application of cognitive load theory is to encourage the reduction of unnecessary load on the working memory. For example, the Education Endowment Foundation's 'Guidance on effective professional development' states that 'strategies that reduce the strain on [working memory], which reduce the burden on teachers' thinking, can promote better learning' (EEF, 2021b, p. 15). However, we must not forget that the intention here is not to eliminate the need for thought, because learning often only happens through thinking hard about something new (Kirschner and Hendrick, 2020). In other words, the goal is to reduce unnecessary cognitive load so that the learner can focus their mental resources on the absolutely necessary cognitive load required to learn something new.

A framework for using AI to support professional training and development

When considering how AI might support teachers' professional learning, we must pay close attention to both halves of this cognitive load puzzle. What is the unnecessary load, for which an AI tool might be able to offer support? And what is the necessary load that we need to protect?

There are some emerging ways in which AI might helpfully ease unnecessary cognitive load during professional development. This will be an ever-growing and changing list(!), but some promising examples that we have already seen are:

1. **Rehearsal:** Using AI-powered simulations with AI-powered feedback could help teachers to reduce the considerable cognitive load associated with facing a scenario for the first time. Imagine being able to teach the exact same 'class' multiple times and gradually learn from the mistakes that you made the previous time. The potential benefits here are obviously dependent on the quality of the simulations and the feedback, but there are some promising studies suggesting that this use of AI can have discernible benefits (e.g. Sailer et al., 2023).

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2. **Reflective practice:** Using AI-powered journalling tools to help to guide your reflections on your own practice can reduce the cognitive load associated with metacognition. Thinking about your own development and learning is not always easy. AI tooling that could guide and prompt reflective practice could free up cognitive resources to focus thinking on the reflective focus. A recent study showed the positive effect of using an AI 'coach' during school placements (L'Enfant, 2024). (See the work of the Noticing Network for some really interesting and thoughtful examples of how this could work.)
3. **Feedback:** AI can be used to give instant feedback on teaching practice. AI tools that will help teachers to analyse and reflect on video recordings of their own practice, highlighting certain key moments and drawing in relevant theories, already exist. Again, the effect of this will depend on how accurate and helpful the feedback proves to be – we should know more soon. (See GoReact's new 'AI Assistant', as an example of this type of functionality.)
4. **Sequencing:** AI outsourcing can be used to support the sequencing of learning. For example, while we may want trainee teachers to eventually learn how to plan great sequences of lessons (more on this later!), we might want them to first focus their attention on practising a narrower skill (for example, tailoring content to pupils with special educational needs and disabilities). AI tooling might offer 'good enough' alternatives so that cognitive capacity can be focused on the specific thing on which we want to focus thought at a particular stage within a sequenced curriculum.

When we outsource thinking, we also outsource the potential for learning associated with that thinking

However, alongside these potential benefits, there are potential dangers. In a world where more and more thinking could be outsourced to AI-powered tools, we must think carefully about what we choose not to outsource. This is especially true if the claims of cognitive science are correct: that we only learn what we have thought deeply about. When we outsource thinking, we also outsource the potential for learning associated with that thinking. We have condensed these issues into a framework of three core categories of question:

- What thinking is unnecessary and safe to outsource? What are we happy for teachers to rarely or never think about (and therefore potentially not ever learn for themselves)?
- What thinking is necessary and should never be ›

- outsourced? What do we want every teacher to be thinking deeply about? (Crucially, this may have a very different answer to 'what is it not possible to outsource?'.)
- If unnecessary cognitive load can be reduced, what do we hope to do with our freed-up cognitive capacity? What do we wish that teachers had more time to think deeply about?

How we answer these questions has major implications for the way we approach teacher education, training and development. We should be designing teacher development programmes and qualifications that make the most of the help that AI tooling can offer. But we must also ground all teacher development on the foundational principle that people cannot expect to learn things that they are not thinking about.

An example: Unnecessary vs necessary thinking in lesson planning

To help to explore some of the implications of the framework questions above, we will use the example of how AI is or could be used to support lesson planning. There are probably some in the sector who would gladly (and do!) outsource the entire lesson planning process to AI. There are also probably others who believe that lesson planning is so intrinsically connected to 'what it means to be a teacher' that they would refuse to outsource any part of their planning process. However, there is evidence that many teachers will be somewhere between these two ends of the spectrum.

A recent trial commissioned by the EEF and evaluated by the NFER found that AI tools could reduce lesson and resource planning time by 31 per cent, and found 'no reduction in quality' of the lesson resources (Roy et al., 2024). It found that this time saving was being made by outsourcing work to ChatGPT (the model used in the study) on very specific tasks. Teachers did not, in general, use AI to plan the entirety of a lesson but focused on specific aspects, such as creating extra questions for a target group in the class or generating ideas for activities for a specific purpose. It's impossible to say whether these narrow time-savers are the only aspects of lesson planning that should ever be outsourced, but it does seem that experienced teachers tended to not outsource thinking when it came to overall lesson design, sequencing or ensuring that the specific needs of the class in front of them were met (for example, the teacher identified the need to have an adapted set of resources for certain groups, but outsourced the actual creation of these resources). Establishing what thinking should and should not be outsourced when planning lessons is not straightforward.

If unnecessary cognitive load can be reduced, what do we hope to do with our freed-up cognitive capacity?

This is further complicated when considering that the unnecessary–necessary distinction will not be the same for all teachers in all contexts. For example, the same EEF study referenced here also considered whether teachers with different levels of experience used ChatGPT in different ways (Roy et al., 2024). Fourteen per cent of the participants were ECTs (early career teachers) or trainees, and they were more likely to ask ChatGPT for 'starting' ideas for how to teach a particular lesson; more experienced teachers sought to use the AI tooling to expand and vary their teaching repertoire. While this is unsurprising, it is entirely possible that because the more experienced teachers have previously spent considerably more time thinking about lesson planning, they have a much more sophisticated 'schema' of the learning process and effective lesson design upon which to draw (Krepf and König, 2022). What if – because of the ongoing use of AI – the ECTs and trainees in this trial never have the opportunity to develop their thinking about lesson design in the same way? What may

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be unnecessary thinking to an experienced teacher may be absolutely necessary thinking to someone at the beginning of their career. When considering what thinking we are happy to outsource and what we need to protect, there will be local, contextual and even personal considerations to take into account.

Finally, assuming that we can identify ways in which we can carefully and thoughtfully reduce the cognitive load associated with lesson planning, how could any regained cognitive capacity be used? Again, the EEF/NFER study gives plenty of food for thought. One example is the finding that some teachers used ChatGPT to rewrite whole texts to be more suitable for a lower reading age – something that could take a huge amount of time for a human to do (Roy et al., 2024). By doing this, the teacher can draw on a wider range of resources and easily adapt them, thus being able to spend more time focusing on lesson design rather than construction. Perhaps by reducing cognitive load elsewhere, teachers might be able to spend more time thinking about individual needs within their class and less time trying to adapt resources in just the right way. As we consider questions about what is and is not necessary for teachers to think about, we should also consider what might be possible to do with any freed-up cognitive capacity.

Conclusion

> *'[I]t is important to recognise that the digital automation of education is not simply a technical matter of how to most effectively design, program and implement systems. Instead, we need to get to grips with questions relating to the nature of education as a profoundly social (and therefore human) process.' (Selwyn, 2021, p. 165)*

Cognitive load theory can be the basis for a helpful framework for considering the use of AI to support teacher training, education and development. If overloaded cognitive capacities reduce teachers' capacities to learn, then we should be open to the ways in which AI could help to reduce unnecessary cognitive load. However, if thinking leads to learning, then an obvious consequence of teachers no longer thinking about something is that associated learning may also be lost. We must therefore be careful to identify the absolutely essential cognitive load of teaching, and ensure that teachers and school leaders continue to think deeply and carefully about these fundamental issues. This is what underpins the framework that we have offered in this article: a balance between reducing unnecessary cognitive load and identifying the necessary load of what it means to be a teacher. This can be summarised in three broad categories of questions: 1) What are we happy for teachers to rarely or never think about? 2) What do we want every teacher to be thinking deeply about? 3) What do we wish that teachers had more time to think deeply about? By wrestling with these issues, we will be much better positioned to use AI to support the authentic development of teachers and school leaders.

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Whose values and beliefs are shaping the conversation?

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Educational organisations are increasingly deciding who will be responsible for leadership around AI in their context, with new roles and remits being evolved to lead this changing landscape.

Yet each of those sharing their expertise or leadership is doing so through a particular lens, bringing specific values and beliefs – a pivotal influence that shapes what is considered and prioritised (Aubrey-Smith and Twining, 2024). For example, organisations that are taking high-level strategic approaches, considering policy, data architecture and infrastructure, privacy, security and training, tend to be larger organisations with significant and often centralised staffing capacity, as well as specialist expertise to lead on these matters (MAT AI, 2024). Colleagues leading on AI in these organisations (whether trusts, suppliers/partners or universities) tend to be from operational backgrounds, or educational leaders with science, technology or mathematical specialist origins, which are generally associated with traditional behaviourist and individual constructivist pedagogical belief systems (Tondeur et al., 2017; Becker and Riel, 1999).

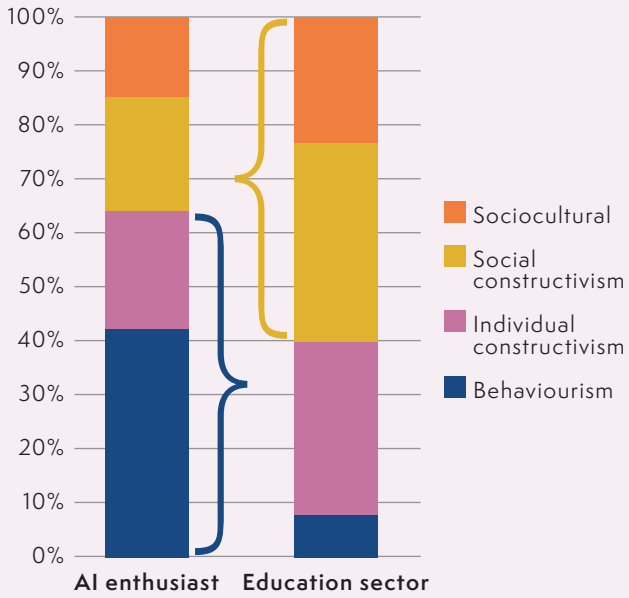
Then there are organisations that take what might be described as an informal action research approach – setting in place policies for guidance, providing training, and establishing responsive working groups that identify issues, seek solutions and engage in agile multi-stakeholder communications (MAT AI, 2024). These tend to be mid-sized and smaller organisations, with AI leadership delivered by individuals with people-centred perspectives. Colleagues leading on AI in these organisations tend to be from classroom practitioner specialist backgrounds and are often more aligned with social constructivist pedagogical beliefs (MAT AI, 2024).

Belief systems – particularly in research that is concerned with digital technologies – are often discussed at surface level, with attention often diverted onto strategies, methods and approaches, rather than the values and beliefs underpinning them (González-Sanmamed et al., 2017; Hurlburt and Heavey, 2006). This can create a narrative wherein colleagues engage in discussion about what is perceived to be a shared understanding about the purpose of a strategy, yet have very different deeper beliefs about what it is intended to achieve and why that may be important.

To show how significant this variance can be, workshops between September 2023 and September 2024 invited teachers and leaders (n = 2,931) across a range of educational organisations to take part in a sequence of activities focused on surfacing espoused pedagogical beliefs (based on activities taken from Aubrey-Smith and Twining, 2024). Within this group, questions were asked to ascertain with which of the four main pedagogical belief systems the person most closely aligned, as well as supplementary questions to ascertain whether the person considered themselves an AI enthusiast or expert.

As **Figure 1** shows, 42 per cent of AI enthusiasts align with traditional behaviourist views, whereas behaviourist beliefs are shared by less than 10 per cent of the other respondents. Conversely, around two-thirds of the wider education sector align with socially oriented belief systems, whereas for AI enthusiasts, this represented

FIGURE 1: **THE ALIGNMENT BETWEEN AI ENTHUSIASTS AND THE WIDER EDUCATION SECTOR WITH THE FOUR MAIN PEDAGOGICAL BELIEF SYSTEMS**



only a third. The significant disparity between the underpinning values and beliefs of those leading on AI and those in the wider sector is striking when the same data is segmented in other ways, such as by phase, role, experience and socioeconomic context.

It is important to note that human value and belief systems are rarely surfaced in a meaningful way by self-reporting alone, nor through AI- (or computer-) aided analysis tools. This is because of an important influence that Hodges (2015) refers to as dialogic undertone, whereby the meaning of a word or phrase is dependent on the social context of its use and a perception of shared meaning. Simple words and phrases can be used to infer belief systems that are seen as socially acceptable but not necessarily implicitly believed by the person communicating them.

In the context of discussions around AI, we must be mindful of this. Conversations around ethics, governance, equity and data will mean different things to different people. A behaviourist pedagogical view on these issues is likely to be concerned with policy adherence and hierarchical operational management, whereas a socially oriented pedagogical lens is likely to focus more on discussions where each stakeholder shows shared ownership over decision-making and consequent actions.

In a study carried out in the autumn of 2024, one group of Key Stage 2 children spoke about their school asking parents for permission to use their photographs on the school website each year, and their parents making that decision on their behalf. The conversation then turned to how AI trawls through online images, using this data to feed into tools and apps that can 'age' someone, in order to predict what they might look like in future years. Such tools, already in widespread use, depend on photographs of real people to train the underpinning data models.

The issue raised by these young people was that their photographs were being made public without their individual consent. Due to their age, their parents were giving the school generic consent for the use of these images, and the school was then deciding when and where they were being posted online. Yet it was the children's identities that could be affected by these representations well into their adult lives. The students saw this as disconnected and unjust.

It is perhaps too early to know how much of an issue these concerns will be over the course of these children's lives. Much depends on wider ethical and governance decisions made by technology companies and legislators. However, as leaders, we can provide awareness and training so that children, parents and staff feel equipped to make meaningful and informed decisions.

In relation to the pedagogical beliefs outlined previously, a leader holding a behaviourist lens on this issue will likely have a different view to a leader holding a sociocultural lens.

Conclusion

The specialism and background of the person leading on AI conversations in an educational organisation directly correlates with the lens through which AI is viewed by that person and, ultimately, their organisation. Drawing on Bourdieu's ideas of capital and habitus, the professional and personal background of the person taking the lead role for the organisation thinking and engaging with AI creates a set of parameters around what that person is likely to tune into and engage with (Bourdieu, 1977). This creates priorities and blind spots but, more importantly, also creates an invisible framework within each person's everyday implicit communications and decision-making. A business leader (or educational leader with a secondary STEM – science, technology, engineering and maths – background) is perhaps more likely to frame AI conversations around policy and operational implementation, whereas an educational leader with an inclusion background is more likely to frame conversations around equity, wellbeing and critical literacy skills. Both are important, and both may be under discussion, but personal bias and prioritisation are likely to affect which is given greater consideration.

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The human in the machine: Exploring the potential, ethics and morality of harnessing AI for workload and assessment

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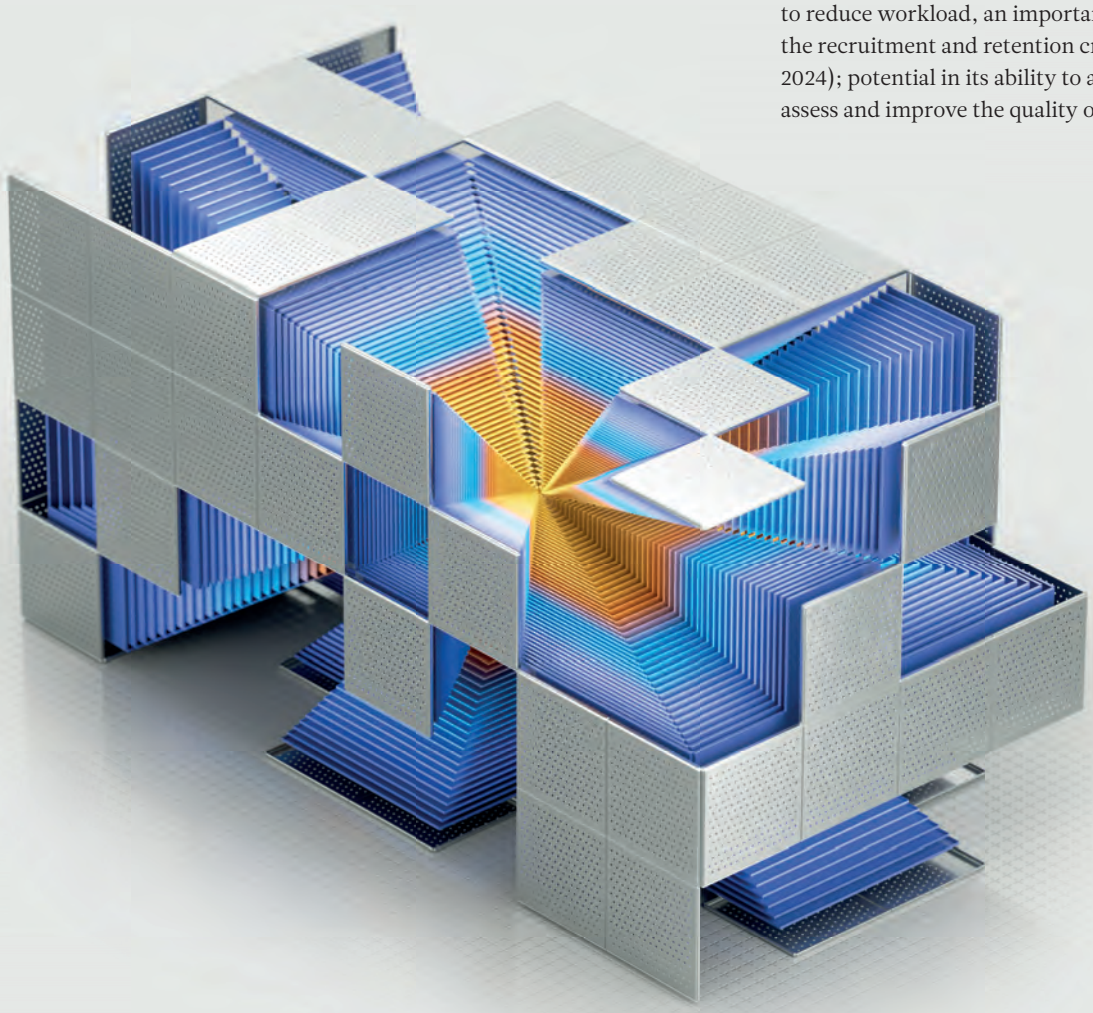
Introduction

The advance of large language learning models (LLMs – AI tools such as ChatGPT) has brought senses of optimism, potential and scepticism within the education world in equal amounts: optimism about its potential to reduce workload, an important factor in the recruitment and retention crisis (NFER, 2024); potential in its ability to accurately assess and improve the quality of teaching



(and thus also improve recruitment and retention); and scepticism about its use entirely. It seems inevitable that AI will play a part in our profession's future, with nearly 60 per cent of us having used it in some form (Hallahan, 2024).

My own position has matured over time: while, on balance, I am optimistic about its use, I would argue that it needs to be more gradually introduced. In the past, technological innovation has moved past our ability to fully understand and regulate its use (Herane, 2024), and the same is happening with AI. Organisations such as the Turing Institute have advocated for the implementation of AI following the principles of fairness, accountability, transparency, privacy and security (FATPS) (Memarian and Dolek, 2023), which, as a framework, is one that I feel is our duty as educators to consider as we integrate AI into our practice further.

Fairness

Fairness can be best applied through two different lenses, one looking at ourselves as practitioners in terms of our work–life balance, and one looking at our students. One of the persuasive positive arguments in favour of AI is its potential effect on teacher productivity and workload. Help in this regard can be best realised through the use of programs such as TeachMate AI, MagicSchool AI and Aila – closed systems created by educators. However, the research base for their effectiveness is limited, so their benefits are anecdotal. Early research includes a recent Education Endowment Foundation study, which found that teachers using ChatGPT to produce resources spent, on average, 31 per cent less time per week without compromising the quality of output (EEF, 2024). However, the study doesn't specify the level of quality previous to AI use. Outside this trial, the quality of AI-generated outputs for resources and lesson planning can vary wildly – mitigated slightly by the closed AI systems. However, if tools such as ChatGPT, Gemini or Bard are used, much depends on the prompt that is given to the tool. Even using a quality prompt, the accuracy of the information provided to you can be suspect. AI tools are programmed to be certain that what they are telling you is correct – but all they are doing is predicting the next words in the sequence that they produce (Williamson, 2023). If AI is being used to bolster subject knowledge, we may not automatically realise that the information generated is incorrect. This is particularly applicable within primary settings, where we need to have knowledge across a variety of disciplines, and there will always be subjects in which we have more knowledge than others. If we rely on AI to do the heavy lifting for us in terms of planning and it's wrong, we are in danger of defaulting on Teacher Standard 3 (DfE, 2011).

The other potential effect on workload relates to assessment. You can upload pupil work to AI and it will offer recommendations based on what it is programmed to analyse. As a teacher within Year 6, I can see the benefits of this when the spectre of Key Stage 2 moderation looms – a tool that can spot grammatical devices and offer edits and next steps is a 'promised land' that is hard to resist. The caveat is when we consider the algorithmic bias present in AI. AI can only generate content based on what exists – and, of course, has no morality (Deshpande et al., 2023). If you upload the work of a pupil with special educational needs and disability, or who speaks English as an additional language, and provide no qualifying information on these external factors that can affect a child's work, the algorithm will assess it in the same way as any other piece of work – thus causing the recommendations to be unsuitable for that child. This problem is exacerbated if we have anthropomorphised the AI tool that we are using.

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One of the persuasive positive arguments in favour of AI is its potential effect on teacher productivity and workload

Accountability

Anthropomorphisation is treating an object as if it were human, something of which we are all guilty when dealing with technology (the ›

tech industry itself capitalises on this – how many of us have an Alexa in our home, or use Siri?). Many AI products have been designed with this in mind, as Deshpande et al. (2023) attest to. The risk of this in an educational context is considerable when you bear in mind that its use can be perceived as a dialogue between you and a helper. However, AI cannot think; it is not human and should not be treated as such (Deshpande et al., 2023). If we accept its findings in our students' work as fact, we are reinforcing the algorithmic bias or being influenced by racial, gender or societal bias (of which AI has no concept).

We also do not know the criteria that have gone into the decision that the AI has generated with respect to a student's work. We can be professionally challenged to back up our assessment decisions; however, we cannot do the same for AI. If we are not challenging the AI's recommendations, and the assessment recommendations that we are using are inaccurate, then we are defaulting on Teacher Standard 6 (DfE, 2011). To my knowledge, only Oak Academy's AI tool Aila is open-source (Searle, 2024) – where the code behind the tool is public-facing. Even then, a substantial amount of technical literacy is needed in order to understand it.

In addition, if we are treating AI as human, then we are holding it accountable for decisions and planning for which we need to be taking accountability ourselves – morally, our students deserve us to be more than a passive participant in these processes.

Transparency

This moral element to the argument deepens when we take into account the thoughts, feelings and emotions of our students with respect to AI. A study conducted by Barnardos found that young people's feelings around the issue ran from excitement to dread, amid fears of AI taking over, privacy and their future job prospects (McLoughlin and McMullen, 2024). If we are feeding AI details about our pupils, or using it to produce resources or assess their work, should we be making it clear that we are doing so? Again, the risk of this is doubled with a tendency towards

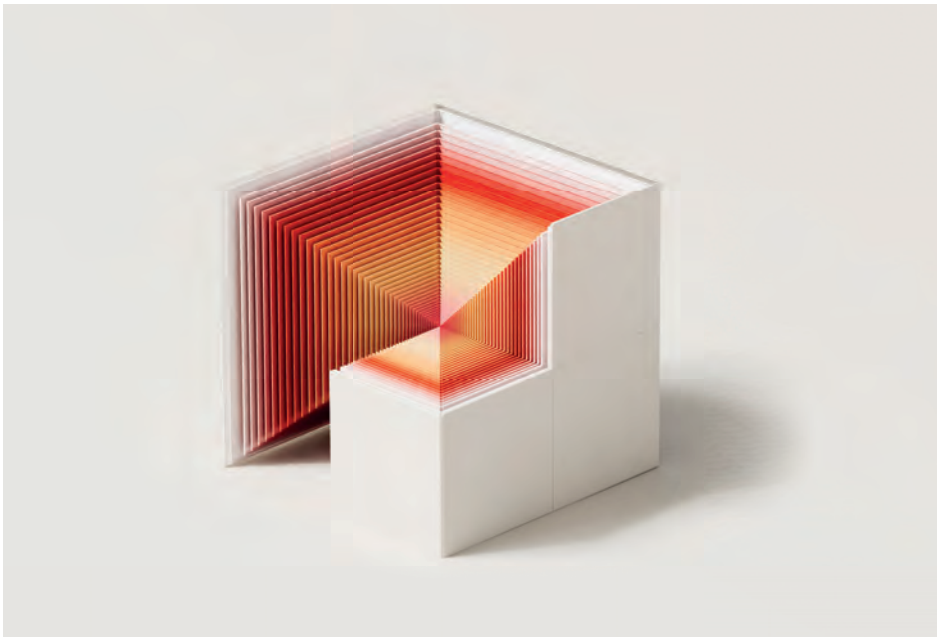
AI cannot think; it is not human and should not be treated as such

anthropomorphisation – if it's clear that we're treating AI tools as a key part of our decision process or we openly refer to it as 'he' or 'she', are we risking ruining our credibility as a practitioner in front of our students?

In addition, one of the selling points of products such as TeachMate AI is the existence of tools such as report writers. The research base for the efficacy and quality of using AI for this purpose is limited, but the potential time saving for educators is massive. However, with the concerns around bias and the use of AI to make decisions about students, the moral argument is clear. Furthermore, the school report process is something that happens just once a year in most primary schools. It's the one time at which children and their parents will receive a report about them as a learner, and while we all have stock phrases that will creep in, reports should be written as if we know the student. If we do choose to use AI, I would argue that transparency is paramount and should be reflected in the AI policy set out by the school.

Privacy and security

A school or trust's AI policy will include information on how the generative AI tools



used by the institution comply with the General Data Protection Regulations (GDPR) (DfE, 2023). Said policy should clearly outline how the tools listed within will meet the requirements for the seven GDPR principles (DfE, 2023). This works well for those tools that have gone through this due diligence; however, if we are using tools that aren't approved by the school or trust (such as ChatGPT, arguably the most prevalent example of an AI tool) and inputting personal or even identifying information regarding our pupils, there is substantial risk of a GDPR issue. Schools and their staff are prime targets for cyber security attacks, with 52 per cent of primary and 71 per cent of secondary schools having experienced a breach or attack in the past year (DSIT, 2024). It is only a matter of time before an AI tool experiences this as well. While most practitioners are aware of the risks around data protection, thanks to robust training processes across local education authorities and multi-academy trusts, it may not be as readily apparent to a lay person that there is a risk in sharing information with these tools. If we are doing this, we need to be taking all measures possible to anonymise anything personal or identifying – especially because our students have not necessarily given us explicit consent to use these tools. These privacy and security concerns should be at the forefront of our minds when using AI tools – technological transformation doesn't always progress with the needs of children as a vulnerable and protected group in mind (Livingstone et al., 2017).

Conclusion

While the balance of this article highlights the risks around AI, for the most part I am a proponent of its use. I do believe that it will form a part of educational practice, theory and discourse in the coming years. However, despite having been around for a while, AI is still a nascent technology in many ways, and we should be cautious about its use. As a profession, we should absolutely engage with it – but should do so with the needs and safety of the students within our care at the front of our minds, engaging with politicians and the creators of these tools to ensure that they are safe. Above all, we need to remember that we are dealing with tools and not people. If we fall into the trap of anthropomorphisation, then we risk taking the recommendations of these tools at face value, reinforcing algorithmic bias. If we are outsourcing all our planning and resourcing to these tools without quality-checking the outputs, we risk undermining our own subject knowledge and credibility as practitioners. Without considering these factors, and the principles of FATPS, the sceptics of AI within education may be proved correct.

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Do pupils dream of electric teachers?

Secondary school pupil perspectives on AI and the implications for teacher professionalism

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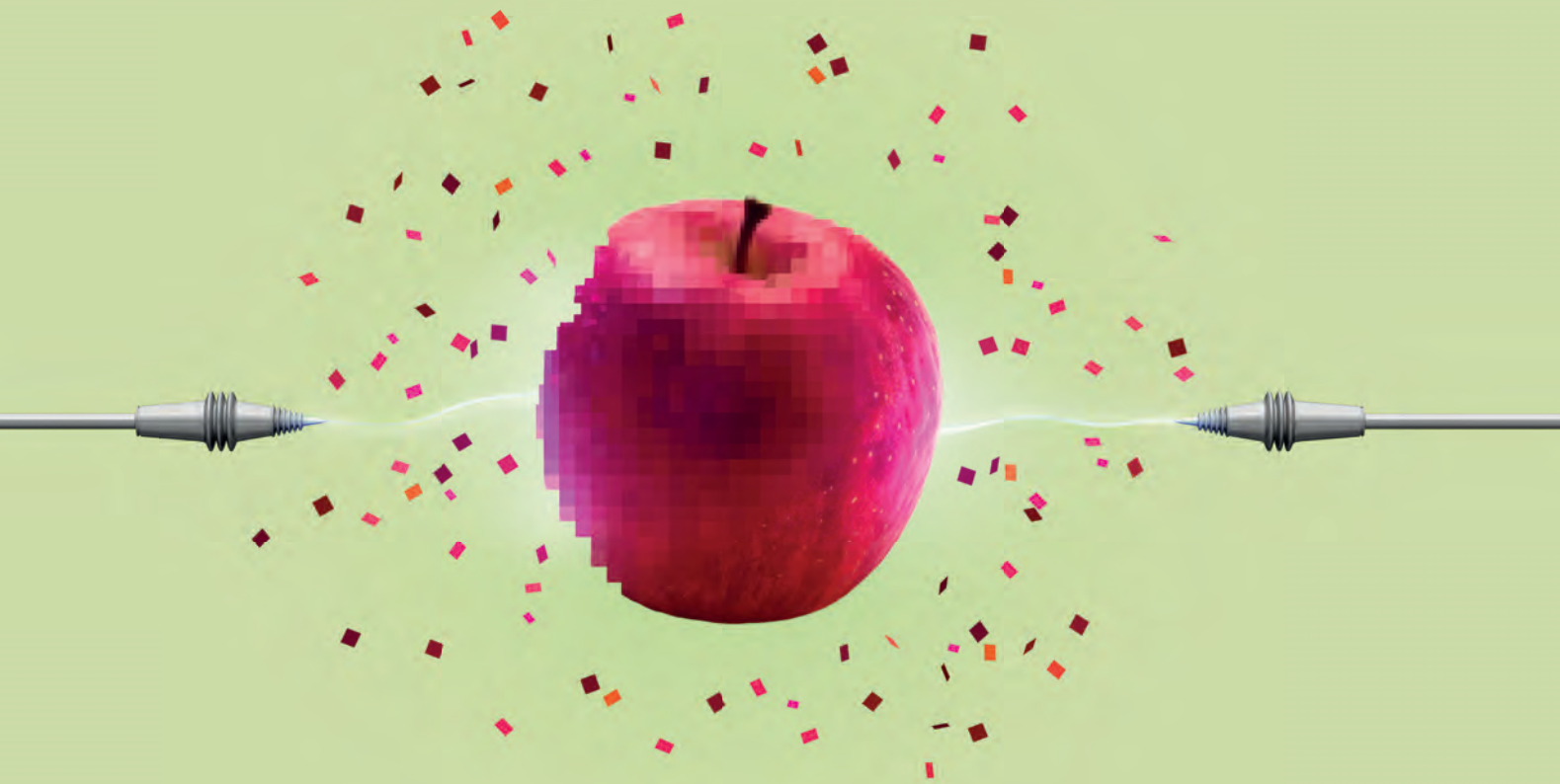
Introduction

The educational landscape is rapidly evolving, with AI emerging as a potential game-changer. Easy-to-access large language models (LLMs) such as ChatGPT, Gemini and Copilot are particularly intriguing, holding the promise of personalised learning paths, efficient research assistance and potentially even automated assessment. However, the potential effect of such technology on the very heart of education – the human teacher – remains a critical question, and there are many 'solutions' being sold that promise to provide interactive tutoring and allow greater academic progress than in-person classroom learning. While there are benefits to this in terms of the well-reported issues around teacher recruitment and retention, the potential



ramifications to the wellbeing of young people must be considered.

This study explored secondary school pupils' perspectives on the use of LLMs in education in an independent day setting. The aim was to understand their experiences and thoughts on the use of LLMs and consider the implications for teachers. By understanding their experiences and preferences, we can gain valuable insights into how to shape AI integration in the classroom, while ensuring that teacher professionalism remains paramount.

Methodology

A survey was distributed to 349 pupils across Years 8, 10 and 12 within an independent secondary day school, achieving a 55 per cent return rate (each year group returning more than 60 responses). The survey was conceptualised based on existing discussions with colleagues and pupils regarding AI/LLMs in education, with questions designed to capture issues such as attitudes towards LLMs' effect on learning and academic integrity. The survey used a five-point Likert scale to gauge pupil agreement with statements about the perceived benefits and drawbacks of LLMs in education. Pupil-initiated discussions were informally held following the surveys to understand more deeply their perspectives on LLMs, particularly with Year 12 pupils. Additionally, LLMs and AI tools were used throughout this research, from providing background literature for discussions with colleagues (Perplexity) to creating the questions (Copilot) and analysing the data (Gemini). This helped a busy teacher to manage the time demands of the research project itself, but did not contribute to the writing or argumentation of this article.

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Key findings

The findings revealed a nuanced pupil perspective on LLMs. Pupils acknowledged what they perceive as the current benefits, with 66 per cent agreeing (Likert scale: 4 or above) that LLMs increase research efficiency and 73 per cent believing that AI can enhance their learning. Fifty per cent report that they would therefore actively recommend AI tools to their peers. In terms of potential future effects, 59 per cent believe that AI tools will replace some elements of teaching. Nevertheless, a clear preference for human judgments emerged: 63 per cent of pupils disagreed (Likert scale: 2 or lower) that they were comfortable with teachers using these tools for marking purposes.

Interestingly, a potential age-related disparity also emerged. While Year 12 pupils reported the highest LLM use for 'research purposes' (with 70 per cent agreeing that 'AI makes research more efficient'), Year 10 pupils reported the highest level of 'reliance' for 'studying' (with 22 per cent agreeing that they 'rely' on AI). This warrants further investigation in terms of the ways in which they use these tools.

Pupil perspectives underscore the irreplaceable human element in education

Concerningly, most pupils reported feeling confident about their use of AI (64 per cent) and the majority reported having little concern about how their data is used (59 per cent). This is especially worrying given that many LLMs, such as ChatGPT, have a recommended minimum age of 18 (or parental consent required).

Thematic analysis of these answers, combined with the open-ended pupil discussions, revealed a strong sense of the irreplaceable role of teachers and, on reflection, the need for education about issues around LLMs. Positively for teachers, pupils valued the human element in education, particularly for tasks requiring:

- **Judgment and critical thinking:** Pupils highlighted the importance of teachers' ability to guide them in developing critical analysis skills and forming well-reasoned arguments, areas deemed unsuitable for solely AI-based learning.
- **Personalised feedback:** The value of personalised feedback provided by teachers, tailored to individual needs, was emphasised. Pupils appreciated the ability to discuss their work with teachers and receive guidance beyond simple right or wrong answers, which may link to their need for emotional stability in their relationships, rather than simply using LLM tools to correct their mistakes.
- **Motivation and inspiration:** The ability of teachers to motivate, inspire and foster a love of learning was consistently identified as an important aspect of education that AI could not replicate.
- **Social and emotional learning:** The role of teachers in creating a positive classroom environment, fostering social interaction and supporting pupil wellbeing was recognised as a crucial human element of education.

Discussion

These findings highlight the complex relationship between AI and the potential future of teaching. While LLMs hold promise for streamlined processes and personalised learning to an extent, pupil perspectives underscore the irreplaceable human element in education. Several major points to reflect on emerged as themes, including the effect on teacher professionalism; the importance of a focus on wellbeing; the benefits of AI tools; and the need for both a collaborative and proactive approach:

Teacher professionalism

The study reinforces the importance of human expertise and professional judgment in areas such as critical ›

thinking development, personalised feedback and fostering a positive learning environment. Students themselves were positive about the potential use of AI tools in education, but still expressed a preference for teacher-led judgments of their learning. These results correspond with the findings of Rodway and Schepman (2023), who found that university students' course satisfaction was negatively affected by the hypothetical adoption of AI tools for grading, despite a generally positive attitude among students to AI tools. One recommendation, therefore, is the necessity for ongoing investment in teacher training and professional development to ensure that educators understand how to harness AI's potential while upholding their crucial role in the classroom. As noted, this research project itself was conducted with the use of AI/LLMs, which made it more viable for a busy teacher, thus helping in professional development through reflective research.

Wellbeing is paramount

The pupil discussions flagged a concern about the effect of AI and technology on pupil wellbeing, particularly after the isolating experiences of the COVID pandemic. Through training and policies, we must prioritise strategies that promote human connection and interaction within the classroom, ensuring that AI integration does not further isolate pupils. Pupils also need to be educated about the potential negative effects of AI tools on wellbeing, which necessitates a keen understanding among school staff – not least due to the potential consequences of AI use during adolescence, which is a critical period of cognitive development (Tuomi, 2018).

AI as a tool for good

Strategically deployed, LLMs can empower teachers by alleviating administrative tasks, streamlining lesson preparation and providing personalised learning pathways. This can free up valuable teacher time to focus on the most critical aspects of their role: fostering deeper relationships with the school wide community.

We must prioritise strategies that promote human connection and interaction within the classroom

Collaboration is key

To ensure responsible and effective AI integration in classrooms, fostering collaboration between teachers and pupils is essential. Intergenerational strategy groups involving both parties could be established to discuss concerns, explore best practices and co-create a future where AI complements, rather than replaces, the human element of education. This collaborative approach would ensure that everyone can have a stake in shaping the future of learning.

Proactive approach

Educators must embrace a growth mindset and actively engage with AI (Luckin et al., 2024). We should not passively wait for others to dictate how these tools are used. Schools can create dedicated spaces for teachers to explore AI tools, fostering knowledge-sharing and experimentation. Additionally, it is crucial to address potential ethical and pupil privacy concerns around data collection and use of LLMs (Council of Europe, 2022).

Conclusion

The future of education is not about replacing teachers with 'robots', but harnessing AI to empower educators and personalise learning. By understanding pupil perspectives, prioritising teacher expertise and fostering collaboration, we can create a future where AI is a valuable tool, augmenting the irreplaceable role of human teachers in nurturing curiosity, igniting passion for learning and preparing pupils for a rapidly evolving world. However, it is crucial that practitioners take the lead in how these tools are used in educational settings, actively engaging in this emerging field and safeguarding pupils from potential harm to their wellbeing and education.

Further research

This study provides a snapshot of pupil perspectives at a single selective independent day school and reflections on implications for teachers. Further research with a larger and more socio-economically diverse sample could provide a more comprehensive understanding of pupil views on AI in education. Additionally, longitudinal studies tracking pupil experiences as they progress through their education could offer valuable insights into the long-term impact of AI integration in schools.

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The 'unreliable magic genie': Helping students to develop criticality in the world of AI in post-16 education

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Introduction

Since ChatGPT reached public consciousness at the end of 2022, AI has become a significant topic of conversation in post-16 colleges. It was met with a variety of reactions from people and organisations, including intrigue, fear and disinterest, depending on the person's perspective on the effect of technology on post-16 education.

The early discourse around AI in general was that it was either 'good' or 'bad' (Bell, 2023). In her article around the initial uses of AI, Bell identifies a range of organisations either extolling AI's virtues in generating content without the need for people or, conversely, condemning its disregard of the truth. Yet some might argue that truth is irrelevant, because large language models (LLMs) such as ChatGPT manipulate language and do not claim to be a repository of knowledge or information. In this article, I will explore the potential risks and benefits of using AI as a classroom tool, discuss potential learning outcomes with regard to both the positives and negatives of AI use, and conclude with some thoughts on the current educational discourse around AI in education.

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The risks that AI poses to post-16 education

The assumption that AI 'knows things' could be dangerous if people remain unaware of this systemic constraint. This danger could extend to students and teachers if they do not have appropriate levels of understanding around AI. This perceived threat is exemplified by ›

the knee-jerk reaction from the Joint Council for Qualifications (JCQ), whose initial document on the use of AI in examined and non-examined work included negative words such as 'malpractice' and 'severe sanctions', and only minimal reference to AI's potential benefits and uses (JCQ, 2024). The general initial discourse around AI in education focused on the perceived threat to learning and academic integrity (Watson and Romic, 2024).

One of the biggest risks in AI use is the tendency to anthropomorphise it (Ryan, 2020). Ryan states that interactions with AI can lead users to think that they are interacting with a person, leading to an 'inherent trust' that we give to people with whom we interact. For example, we may assume a willingness to interact in a person; however, AI is not a person and has no inherent willingness, trust or even ethics (Ryan, 2020). People can interact with LLMs and communicate in language that simulates personal interactions, but those interactions are entirely generated by a neural network that simulates language, without the core thinking that makes human communication important – the human filter. The human filter is what helps people to understand what is appropriate or accurate (Casas-Roma et al., 2023). Casas-Roma et al. and Ryan both state that users are likely to think that AI has presence of mind and to trust its provided information, in the same way one might with a human. However, in reality, an LLM simply uses the word that is most likely to follow the previous one in its interactions. It's the unreliable magic genie. It appears to be generating information – but there's no discernment behind the words, sentences or ideas. Instead, it uses an algorithm and a probability of 'likeliness' – and while algorithms are unambiguous, knowledge is not.

The benefits of AI in post-16 education

The World Economic Forum identified several ways in which AI could enhance education. The potential benefits include personalised learning, refined assessment and evaluation, optimisation of teacher time, and the teaching of AI use as a skill in itself (World Economic Forum, 2024). It is perhaps this last point that is the purpose of approaching AI use in post-16 education.

Watson and Romic (2024) view LLMs as mediating tools that affect people differently depending on their relationship with the LLM. AI can be a tool that enables those who understand and use it effectively to achieve more in thought and action. Conversely, it can be a potential barrier to those who cannot use it, by excluding them from the affordances that it offers – for example, those who cannot buy a subscription for premium features. This could widen the digital divide in society, with AI becoming an educational tool that is most easily accessed by those who can afford it (Bentley et al., 2024; Serafina, 2019).

AI contains inherent flaws and risks, but also presents opportunities to support students in their future lives. Using Watson and Romic's (2024) identification of technology as a bimodal mediator between thought and action and between thought and society, technology can affect an individual's thoughts, actions, communication and interactions with society. In other words, technology is a tool that can both help users to turn ideas into a tangible outcome (for example, using music software to turn an idea for a song into a finished track) and influence how we interact with wider society (for example, social media influences our fashion, culture and interpretation of the news). In this light, an important question is: how can we enhance students' academic, personal and social development by using AI as a tool to prepare them for the world?

Using AI to develop students' critical thinking

When I approached my own use of AI with A-level students, I bore in mind the tensions between the unreliable nature of AI's generated content and the potential to use it as a tool to aid academic, personal and social development.

SHUTTERSTOCK

AI in general, and LLMs specifically, can be a great tool to help students to develop their own sense of criticality and analysis. LLMs are very quick at generating content, whereas manually generating exemplar content for students to use is time-consuming and arduous. LLMs can create variable-quality content rapidly, and students can review this as part of developing their analytical skills. This material can be used by students to contrast with their own work and identify where the AI has created successful or 'good' material and where it has generated less helpful information.

One example of this process is the cross-referencing of information that AI presents. LLMs can access a wide range of documentation, and some have incorporated web searching facilities. But they can make mistakes. Asking a politics student to use AI to identify Hansard references is interesting. Depending on the specific AI (LLM), the reference could be genuine, from a web search, or fictitious and made up from the LLM's neural network of common words. Ensuring that students are aware of AI-generated material's limits is essential to ensure the technology is used appropriately.

The use of AI to create material is one of the concerns raised in the JCQ report on AI and plagiarism (2024). However, the quality of AI-generated material is such that it requires the students to hone and develop the responses to suit what they are trying to achieve (at least at the moment). The creation, editing, additional creation and further synthesis are akin to the process that one might go through in any academic piece of work (writing, editing, rewriting) – and the skills required to do this are similar to the synthesis that one might use when completing other research activities, combining different sources into one appropriate narrative.

We need to reframe the conversation to focus more on 'when' and 'why' we should use AI

This is a skill that I am actively promoting with my students. I am encouraging students to use AI when they think that it is appropriate. This is helping them to develop a sense of criticality to the responses given and ensuring that they do not use unverified facts in their work. This level of criticality is a skill that will prepare them well for their professional lives, and links effectively into Watson and Romic's markers for AI and technology as a mediating device for academic, personal and social development.

Next steps

The discourse around AI in post-16 education has largely been around 'how' to use AI in teaching. Indeed, conference programmes and current articles and books tend to reflect this focus (e.g. Bowen and Watson, 2024). However, perhaps we need to reframe the conversation to focus more on 'when' and 'why' we should use AI. When does it serve educational purposes and why use it that way? We need to include discussion and training for post-16 students to develop the skills of how to critically approach AI-generated content, and to know what is reliable and what is unreliable. This will help them to develop their academic, personal and social development and prepare them for the post-education world.

As teachers, we need to acknowledge both the flaws of AI and the potential opportunities; perhaps it is the tensions between these that offer meaningful 'whys'. While AI is not a magic genie, it is another tool that can be leveraged appropriately to support our students.

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AI spy: Tracking the tools that teachers use

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Since 2020, Teacher Tapp has been checking how teachers are adopting AI tools. In November 2024, we asked teachers: What AI-powered tools or technologies (if any) have you used or experimented with in your teaching practice?

The data featured in this Teacher Tapp research has been gathered from our daily surveys of more than 11,000 teachers. We have aimed to represent the teaching population overall by:

1. 'Reweighting' the sample each day. This means statistically rebalancing the results using the Department for Education workforce census (DfE, 2024) to ensure that there is the right proportion of teachers by gender, age, phase, job seniority and region.
2. Checking the results from key questions against other national surveys. This shows that we get very similar results to other 'random sample' surveys (see Jerrim, 2023).

What do teachers use AI tools for?

1. **Generating model texts:** Teachers use AI tools to create model texts (also known as 'What A Good One Looks Like', or WAGOLL) that exemplify writing features, vocabulary and text types for students to analyse and emulate.
2. **Writing reports:** AI tools have been used by teachers in writing various types of report, including student reports, professional development reports, governor reports and subject reports. They say that it helps to generate comments, phrases and entire paragraphs, saving time and effort.
3. **Creating resources:** Teachers use AI tools to create resources such as worksheets and comprehension questions based on various sources, including texts, videos and YouTube transcripts.
4. **Lesson planning and curriculum development:** AI tools have been used by teachers to help in generating lesson plan ideas, sequencing lessons, creating lesson overviews and outlining schemes of work. It has helped teachers to explore new topics and organise their teaching content more effectively.
5. **Writing letters and emails:** Teachers use AI tools to help to draft professional communication for parents, staff and stakeholders. Teachers have used it to assist with wording sensitive topics, creating templates and ensuring clear and accessible language.
6. **Generating quiz questions and multiple-choice questions:** Teachers have used AI tools to create quizzes and multiple-choice questions for a variety of purposes, including retrieval practice, formative assessment and homework assignments. They use AI tools to generate questions based on specific texts, videos or topics, and to provide answer keys and mark schemes.
7. **Simplifying and differentiating text:** Teachers adjust the reading age and complexity of texts to make them more accessible for students with varying reading abilities and learning needs. They report that this can be particularly helpful for students with English as an additional language, and those with special educational needs and disabilities.
8. **Creating revision resources:** Teachers in secondary schools use AI tools to generate revision materials, such as summaries, keyword lists, flash cards and quizzes, helping students to prepare for exams and assessments.
9. **Providing model answers and essay structures:** Secondary school teachers have used AI tools to generate model answers and essay structures for various exam boards and subjects, allowing students to see examples of high-quality work and understand the expectations for assessments.
10. **Generating creative content and stimuli:** Teachers use AI tools to write poems, stories and scripts for various purposes, such as providing examples of different writing styles and creating classroom activities.

Generic AI tools versus education-specific tools

Launched in 2022, ChatGPT quickly amassed millions of users. We tracked teacher adoption of ChatGPT across three months in spring 2023, and saw a significant growth in awareness of the product during this relatively short period, as well as increasing usage. Among teachers who used ChatGPT, around half were using it to help with their school work.

Use of education-specific AI products remains low; fewer than three per cent of teachers had used more than one of the tools that we tested, and only 24 per cent had used at least one of them in the past six months. This compares to 34 per cent of teachers having used a generic AI tool (for example, ChatGPT) in the past week. The most common functionalities named by teachers were lesson planning (included in 15 of the 28 tools), resource creation (12) and quiz generation (11). There is also a strong degree of overlap between these functions, with 22 of the 28 products including at least two functions. Other popular functions include assessment (10), writing reports/communicating with parents (nine) and differentiation (nine).

New tools

Of the 28 AI tools identified by teachers in November, 19 came from companies established in 2023, reflecting a recent surge in educational technology development.

TeachMateAI, established in 2023, has some of the highest awareness, usage and recommendation scores of any of the AI tools we looked at.

Among the more established companies, there is a fairly even split between tools that offered solutions using AI before the widespread commercial awareness caused by the launch of ChatGPT (such as Quizzizz), and those from existing tools that have built a new AI feature (such as KeyGPT or Aila from Oak National Academy).

More than half of the teachers had not used any of the AI tools that we tested. Generally, the use of education AI tools was higher among teachers who already used generic AI products, such as ChatGPT. In other words, teachers who use generic AI products are more likely to use education-specific AI products than their colleagues.

Supporting teachers

As AI use becomes more widespread in education, AI advocates and school and trust leaders have an opportunity to guide and support teachers at all stages of familiarity and adoption. Here are four practical strategies for engaging different groups of teachers.

1. Teachers who are new to AI

These teachers may have heard of AI but lack a clear understanding of its relevance to education.

- **Raise awareness through simple messaging:** Use research evidence to explain how AI tools can save time, reduce workload or improve teaching outcomes.
- **Showcase real-world examples:** Provide case studies of how other teachers use AI in similar contexts.

2. Teachers who haven't used AI for their work

These teachers may understand AI conceptually but feel unsure about how to incorporate it into their practice.

- **Offer practical resources:** Create downloadable templates or step-by-step guides on specific AI uses, such as generating lesson plans or creating differentiated resources. Make this as specific as possible to the year groups and subjects that they are teaching.
- **Provide hands-on experiences:** Run interactive workshops where teachers can try out AI tools in a supportive environment, with clear demonstrations of their use and benefits. These can take place online at the end of the school day, with teachers using free AI tools or your own products.
- **Address common concerns:** Proactively tackle barriers such as time constraints, lack of confidence or worries about accuracy, by highlighting how AI can complement – and not replace – teachers' expertise. Provide courses on responsible AI use in education. Emphasise ethical considerations, such as data privacy and avoiding bias.

3. Teachers who are casual AI users

This group uses generic AI tools, such as ChatGPT, but hasn't explored specialised educational AI products.

- **Explain additional benefits:** Emphasise how education-specific AI tools address privacy concerns, align with curriculum requirements or include features tailored to teachers' needs.
- **Provide quick comparisons:** Create side-by-side comparisons showing how education-specific tools can be more efficient, secure or relevant than generic tools.

4. Teachers who are regular users of AI

These teachers have already integrated AI into their work but may not yet use education-specific tools.

- **Focus on advanced features:** Highlight how education-specific tools go beyond the basics, such as generating curriculum-aligned assessments or providing student-specific interventions.
- **Promote communities of practice:** Build online or in-person communities where experienced users can share tips, resources and success stories.

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Using generative AI to enhance teaching and learning

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Cornerstone C of E Primary in Hampshire is a Microsoft Showcase School and a partner in Hampshire EdTech Hub. An aspect of both of these roles is to explore different ways of using technology and to provide examples as case studies – particularly from a primary school perspective – to share with other staff and schools.

John Hattie (2023) states: 'It is time to focus more on the implementation effects when using technologies along with teaching methods' (p. 408), and a recent Education Endowment Foundation report agrees that schools should 'consider the pedagogical rationale for how technology will improve learning' (Stringer et al., 2021, p. 4).

Generative AI

We were interested in exploring how we could benefit from the use of generative AI (GenAI) in our various roles. Following staff CPD (continuing professional development) sessions, staff discussed and agreed the purposes for using AI. There are two main agreed purposes, outlined in our AI policy:

1. to enhance teaching and learning in classes across the school and improve outcomes
2. to support and reduce workload for staff across the school (Cornerstone C of E Primary School, 2025).

Responsible use

The digital leaders at Cornerstone networked with a range of external educational technology (EdTech) experts and read a range of blogs and research to further their understanding of GenAI and how it was being used in different settings. This was then shared with the staff team, who discussed and agreed their responsibilities to address any potential issues of using AI. Only staff access and use GenAI at Cornerstone. Their responsibilities are summarised below:

- Staff should ensure that their use of AI systems treats all people fairly
- Staff should ensure that their use of AI systems is reliable and safe
- Staff should ensure that their use of AI systems is secure and respects privacy
- Staff should ensure that their use of AI systems is transparent and understandable
- Staff must be accountable for their use of AI systems
- Staff must take responsibility for any content generated by AI by checking for accuracy, reliability and fairness.

Development and case studies

Staff at Cornerstone received training through staff meetings on a range of GenAI apps (including ChatGPT, Microsoft Copilot and Suno) and were encouraged to trial a range of purposeful ways of using these. They created case studies to share and evaluate how they have used AI and the effect that it has had on student learning. These were then shared so that staff could learn from each other. The following case studies are examples from Key Stages 1 and 2.

Case study A: Key Stage 1 English – *Bog Baby*

Purpose for learning

The first week of the English unit of learning required students to write a character description within the context of the story *Bog Baby* by Jeanne Willis. To add purpose and enrichment, instead of the children writing a similar description of the main character, we planned for them to imagine, create and write about their own 'Bog Baby'. Once the children had written their description, this would then be put into a GenAI app to generate a picture of their writing.

Application

In Year 1, the teacher modelled Microsoft Copilot at the beginning of the unit. This involved them inputting a brief, simple description and the class viewing the image that was generated, before adding more words and phrases to change the AI outcome. The children then created their own character descriptions using a range of features, including noun phrases and simple and compound sentences.

In Year 2, Microsoft Copilot was modelled as above. The children then created their own character descriptions using expanded noun phrases, similes and adventurous vocabulary.

Effect on learning

By modelling the use of AI to generate images as part of the input, we could clearly distinguish the importance of using noun phrases when writing to enrich the character description. The children were extremely motivated to write, and passionate about sharing the 'Bog Baby' that they had created.

Case study B: Key Stage 2 English – Planet Zigon

Purpose for learning

We aimed to plan a non-chronological report on a 'newly discovered planet' called Zigon.

Application

The learners in Year 5 had to apply the grammar that they had been taught during their English learning journey (modal verbs, figurative language and fronted adverbials) to describe their own version of the planet Zigon. The class used Microsoft Copilot to generate a few images of what Zigon could look like to help them to think of ideas. We then entered some descriptions into Copilot from the WAGOLL example (What A Good One Looks Like), plus some additional elements. We then input a prompt to AI to generate an example of Zigon as if it were a planet like Earth.

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The AI use in this lesson created a sense of awe and wonder for the children

Effect on learning

The learners were able to visualise the planet and come up with a more effective description and some carefully crafted sentences, applying the grammar that had been taught and practised. As this task was focused on giving the learners ownership of the planet that they were creating, and therefore they were encouraged to use their imagination – which, for some children, can be challenging – AI was a useful tool for creating a few different ideas of what the planet could look like.

Using a GenAI tool to generate example sentence starters also supported some learners with special educational needs and disabilities (SEND) or English as an additional language. The AI use in this lesson created a sense of awe and wonder for the children, who were fascinated by the pictures generated by their descriptions.

Case study C: Key Stage 2 English – *The Raven* poem, for pupils with SEND

Purpose for learning

In school, we have a range of learners who sometimes require work to be simplified or the use of scaffolds to allow them to access the same learning as others.

Application

We used Microsoft Copilot to carefully create a prompt that simplified the poem into language that certain learners in Year 6 would be able to access.

This version was then copied into Widgit (a GenAI tool) to generate a dual-coded version of the poem, including both text and images.

Effect on learning

The learners with SEND were then able to access the learning task and join in whole-class discussions, after having a much better understanding of the poem that had been simplified. It also allowed the learners to be able to partake in lessons and feel part of the whole class.

Conclusion

As a school, we have seen many benefits for staff and learners in our developing use of GenAI. We will continue our learning and developments by taking part in Ofsted's AI research project. We want to maintain oversight of its safe, purposeful and responsible use through a balance of innovation and exploration with governance and accountability. We are achieving this through our AI policy and regular senior leadership team and staff meetings. We aim to keep producing case studies to share examples within our staff team and with the wider primary education sector.

This article is based on The impact of AI on enhancing teaching and learning (Cornerstone C of E Primary, 2024).

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SOME REFLECTIONS ON THE SAFE AND EFFECTIVE USE OF AI IN EDUCATION

AI training at Gordonstoun School

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We ran our first staff CPD (continuing professional development) session on using AI in April 2022 and have been encouraging staff to trial the use of LLMs (large language models) ever since. The aim of our CPD sessions is to give teachers an understanding of what LLMs are and show how they can be used to streamline administrative tasks and inspire innovative lesson planning, while advising staff on the need to follow existing General Data Protection Regulations (GDPR) and safeguarding guidelines. As a school that is signed up to Microsoft 365, we have access to Microsoft's LLM Copilot, which provides an extra degree of data security and privacy. We are in the process of developing an AI policy for staff and students, which will be implemented in September 2025. This will outline ethical and effective AI use within our school.

Gordonstoun believes in preparing students for a future in which AI plays a role in their lives and careers. All senior school students (aged 13–18) have access to laptops and are encouraged to use ChatGPT and Copilot in lessons, under teacher supervision. We have incorporated AI into independent study advice sessions, teaching students how to use AI tools for tasks such as mind-mapping and summarising information. By giving students this training, we aim to promote active learning and critical thinking. We also ensure that students are aware of the Joint Council for Qualifications rules regarding AI use in coursework, and encourage them to critically assess AI-generated content.

To foster a culture of innovation, we have established an informal group of 'pioneer' teachers from various departments. These teachers meet regularly to share their experiences and ideas using AI, recognising that AI application and use can vary across subjects. This collaborative approach allows us to develop tailored AI solutions that enhance teaching and learning in diverse ways.

Embracing digital change at Woodland Academy Trust

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Our AI curriculum, designed for Years 1 to 6, introduces children to the opportunities and challenges of AI, fostering digital literacy and critical thinking. With a Universal Design for Learning approach, we create inclusive lessons that help students to explore real-world applications of AI while encouraging creativity and curiosity. We also give students the knowledge and skills needed to use AI responsibly and ethically, helping them to become thoughtful digital citizens.

A working group of members of staff from across the trust play an important role in exploring how AI can reduce workload and enhance teaching, particularly in lesson planning. We hold regular expert-led training sessions, alongside opportunities to experiment with AI tools in a supportive environment, which allow staff to test new ideas and share best practice. This culture of collaboration empowers our teachers to become digital leaders and lifelong learners. Our educators also connect with peers from across the global education community online, to exchange ideas and learn from others' successes and challenges. This open, outward-looking approach ensures that we not only bring fresh ideas into our classrooms but also contribute our own experiences to the wider conversation about digital learning.

Our work with AI is only just beginning. We're exploring new ways in which to integrate AI across the curriculum, from cross-subject projects to administrative efficiencies that give teachers more time with students. In order to demonstrate our commitment to this and to inspire innovation in our staff, we organised an AI conference at the start of the academic year with industry experts from across the sector presenting ways in which AI could support our colleagues in their various roles. As technology evolves, we'll continue to learn from our peers, experiment with new ideas and keep students' learning at the heart of everything we do.

Using AI tools for T Level lessons at Southport College

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We have found AI tools to be particularly useful in generating T Level resources. These include reading materials, presentations, worksheets and plenary activities. ChatGPT can help with some of these tasks, but the following specialised tools can be more efficient:

- **Gemini** offers customised responses and benefits from web access, making it ideal for current affairs. Teachers can use bullet points from a specification to generate content, but they must manually check the accuracy of the outputs.
- **Gamma** automatically generates presentations based on lesson notes. It creates summarised PowerPoint slides, saving time and reducing workload.
- **TeacherMatic** enables the creation of various student activities for use in lessons, such as multiple-choice questions and fill-in-the-blank exercises. Resources can also be based on uploaded documents, such as Gemini-generated articles.
- **Notebook LM** can generate a podcast from a written PDF document. Dyslexic T Level students have found it useful to have the document spoken to them. They felt that it improved their understanding of managing risks in software development and found the podcast style engaging. However, some students felt that the voices were too robotic.
- **MagicSchool** offers various tools for teachers and students. Teachers can create project plans for project-based learning, complete with rubrics. While the initial output needed adjustments for the T Level, it provided a starting point for a student research project. The generated rubric was adapted into a peer assessment and feedback activity. Using these tools made the process much quicker and easier than writing everything from scratch.

AI tools can reduce workload when designing lessons from scratch. They offer structure and content suggestions. However, there are still limitations. AI's datasets are vast but lack depth in teaching methods and classroom applications, and many teachers face challenges in adopting AI tools due to limited digital confidence and understanding of the technology. For AI to be truly effective in education, ongoing training for teachers is essential.

What could a policy on safe use of AI look like in schools?

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AI is rapidly evolving and its use in education is becoming more widespread. This shift has huge ramifications for how and what Ofsted inspects, with the focus moving more towards learning and learner attributes, rather than rote learning. Prioritising so-called 'soft skills', such as emotional empathy, communication and teamwork, together with AI training and support for practitioners and students, is a priority, so that AI can evolve as a friend and not a foe.

The main principles of responsible AI development are undoubtedly privacy and data security. Generative AI models are trained on a vast amount of data that is extracted indiscriminately from the internet, so transparency, attribution and addressing bias are important. As a starting point, creating an AI school policy could include the following considerations:

- **Support learning goals:** Ensure that any integration of AI tools supports and enhances the school's curriculum objectives. AI should be a supplemental resource that promotes personalised learning, fosters critical thinking and enriches the educational experience, while upholding the integrity of the role of the expert teacher.
- **Manage risks and privacy:** Prioritise safeguarding by addressing the risks associated with AI, such as deepfakes, impersonation and misuse of AI tools. Policies should ensure compliance with GDPR and all other data protection regulations.
- **Act transparently:** Maintain clarity about where, when and how AI tools will be used within the school, ensuring that all stakeholders, including parents and learners, are informed. Staff should take responsibility for the quality and accuracy of any AI-generated content.
- **Respect ethical standards:** Emphasise the importance of ethical AI use, including active avoidance of bias, respect for intellectual property and promotion of fairness and inclusivity. Establish protocols to ensure that AI tools align with these ethical principles. Periodic reviews of AI tools to identify and address any potential biases or ethical concerns should invite feedback from learners and staff.
- **Train and monitor:** Give staff the necessary training and ongoing support to use AI effectively and responsibly, in a way that complements their professional expertise. Monitor AI's effect on teaching, learning and administrative tasks, and adapt practices based on outcomes and feedback.

Conclusion

Integrating AI as a valuable technological tool, alongside other modes of learning, allows for an iterative and reflective approach. Learning with AI is only going to be truly effective if embedded across the curriculum and woven into policy, with time built in for students and staff to learn how to use it effectively and safely, and in conjunction with the development of other important skills.

How can we drive up quality standards in AI-generated teaching resources?

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Following the launch of ChatGPT in 2022, the educational technology market has been flooded with AI tools to support teachers with time-consuming tasks, such as lesson planning or creating lesson resources. This has resulted in two-thirds of teachers using AI in their work (Teacher Tapp, 2024). Ensuring the accuracy of the content that is produced is crucial, as inaccuracies and biases in AI-generated content can exacerbate misconceptions in classrooms and be detrimental to student outcomes (Levonian and Henkel, 2024). Limited checks on the quality of such content (Chiu et al., 2023; EEF, 2025) make it challenging for teachers to make good decisions about the use of AI tools within their schools.

As a publicly funded body, Oak National Academy aims to improve student outcomes and close the disadvantage gap by giving teachers high-quality curriculum materials. We have created curriculum sequences and more than 10,000 open-licence lessons and resources that are aligned with the National Curriculum for England. These have been designed and quality-assured by expert subject-specialist teachers, in line with Oak's evidence-informed curriculum principles (McCrea, 2023). Having codified and exemplified high-quality curricula, we have been in a unique position to design Aila, a free-to-use AI-powered lesson planning tool.

In this article, we provide a brief summary of a paper we published with MIT Open Learning (Clark et al., 2025), and present a case study demonstrating how our AI-powered auto-evaluation tool can be used to evaluate and improve the quality of multiple-choice quiz questions.

How we designed our AI lesson assistant

Aila is designed to support teacher agency by enabling them to adapt lesson plans step by step to better suit their students. Prompt engineering has allowed us to incorporate our existing curriculum design principles into a detailed AI prompt, with examples and non-examples to support the AI model in designing a pedagogically rigorous lesson. We use a technique called 'retrieval augmented generation' to incorporate content from our large corpus of lessons and resources.

Alongside user evaluation, we have also built an auto-evaluation agent (a tool that uses AI to judge the quality of AI-generated content) to enable us to check the accuracy, quality and safety of the lessons that Aila produces.

Improving the quality of multiple-choice quiz questions

We wanted to understand how closely aligned the auto-evaluation agent was to judgments made by expert teachers.

To do this, we first created a dataset of 4,985 lessons. The lessons were across all four key stages and included maths, English, history, geography and science. We used the agent to score the lessons on a range of different evaluation benchmarks, including the use of Americanisms, age-appropriateness, cultural/gender bias and progressive increase in quiz question complexity, and then provide a justification for each score. One area identified by the agent as being below the expected quality was multiple-choice quiz question distractors (incorrect but plausible answer choices).

Looking specifically at the quality of quiz distractor answers in our quizzes, we wanted to understand three things:

1. What makes a multiple-choice quiz question distractor high- or low-quality?
2. How closely aligned was our auto-evaluation agent with expert teacher judgments?
3. Could we improve the alignment further using findings from human evaluations?

We recruited 20 teachers, currently working at Oak National Academy, to participate as evaluators. The group had an average of 14 years of teaching experience in both primary and secondary schools. We asked them to evaluate randomly assigned multiple-choice quiz questions from their subject specialism, using the same evaluation criteria as the auto-evaluation agent. Participants were asked to rate the quality of answers on a scale of 1–5 in terms of the answers being minimally different from each other (with 1 being significantly different and 5 being minimally different), and to add a justification for their score. Participants assessed 311 multiple-choice questions from the dataset, averaging 16.4 questions each.

How we measured quality

By analysing patterns in the assessments and justifications for low- and high-quality distractors given by the teacher participants, we concluded that the auto-evaluation agent was effective, but there were some areas for improvement. We identified some major themes in the AI-generated multiple-choice quiz questions to help to determine what makes a low- and a high-quality distractor:

- **Low-quality distractors:** These included opposite sentiments to correct answers (for example, the correct answer was a positive trait and the distractors were all negative traits) and/or had a different grammatical structure to the correct answer, as well as the correct answer repeating words from the question but the distractors not doing so.
- **High-quality distractors:** These incorporated common misconceptions, shared thematic consistency with the correct answers and featured similar grammatical structures to correct answers.

Armed with these insights, we codified our findings with accompanying examples and incorporated these into our auto-evaluation agent's prompt (the instructions that we have given to the tool). The results were significant:

- Our AI-powered auto-evaluation tool now produces judgments that are more aligned with those of the expert teachers. We know this because the difference between auto- and human evaluations decreased (mean squared error reduced from 3.83 to 2.95) and the agreement increased (from 0.17 to 0.32, measured using a Quadratic Weighted Kappa).
- We were also able to incorporate these findings into Aila's main prompt, which improved the quality of the quiz questions produced.

Implications for pedagogy

We hope that by sharing what we have learned through this work, it may help other teachers to make informed choices about the AI tools that they are using:

- **Start with quality:** Access to high-quality original materials is essential for building effective AI tools. General-purpose AI tools are trained using datasets that contain a broad range of materials that are not education-specific. The combination of a detailed, context-specific system prompt alongside augmentation of high-quality underlying content is essential to produce quality classroom materials.
- **Codify excellence:** Defining and exemplifying high quality helps to guide AI tools in producing appropriate content and enables the setting of clear benchmarks for evaluation. When using general-purpose tools, teachers can give additional guidance in their prompt to define excellence in their context, but this is already built into Aila.
- **Iterative evaluation:** Cycles of auto- and human evaluation refine tools over time, driving quality and consistency. It is important that we find ways in which to ensure that the expert teacher is kept in the loop, both in the design of the AI tool and in the generation of the AI content.

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A learning curve? A landscape review of AI and education in the UK

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In January 2025, the Nuffield Foundation and Ada Lovelace Institute published 'A learning curve? A landscape review of AI in education in the UK' (Samson and Pothong, 2025). The paper seeks to inform conversations around the use of education technology (EdTech) and AI in UK schools. Our aims were to build a common understanding of AI and to provide an overview of the existing tools that are being used in many UK schools. Drawing on existing and emerging evidence, we also pose questions for the further research that is needed to ensure that AI works for everyone in education. This article introduces some of the major areas explored in the paper.

Defining AI

AI is shorthand for a spectrum of concepts and components that enable or support very different functions. While there are many different types of AI systems and techniques, they have a common set of components.

Narrow AI systems are designed for a particular task and, despite being trained on vast quantities of specific data, they are limited in scope and can only do the task that they have been trained to do.

Recent advances in AI research have created more powerful AI systems, referred to as general-purpose AI, that can carry out many tasks for which they may not have been explicitly or exclusively trained. Aside from their power and speed, general-purpose AI systems can also be used to develop applications for many different tasks, purposes and domains.

The generative AI (GenAI) systems that are the topic of conversation in relation to education are just one of the many types of system that can be built on top of general-purpose AI. When we use ChatGPT, Microsoft's Copilot, Dall-E or any other GenAI systems, we are connecting with a chat interface that is hosted by a general-purpose AI model.

It is likely that we will see AI in education extend beyond GenAI's generative capabilities to general-purpose AI's more diverse and broader capabilities. Acknowledging this and ensuring that general-purpose AI is a focus of the conversation will be critical if policymakers and educationalists are to stay abreast of the breadth of AI.

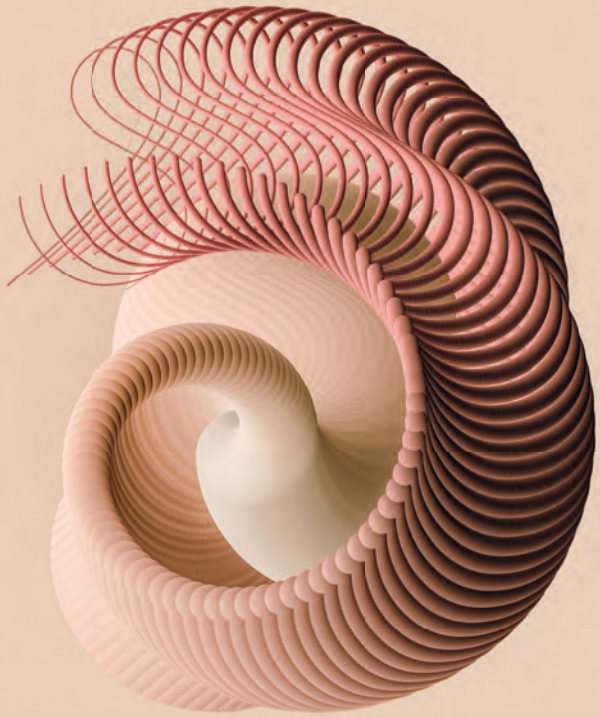
Similarly, it is important that the issues associated with AI are acknowledged, understood and addressed before it is widely adopted in education – for example, data privacy and security, or the challenge of understanding the data on which a system has been trained.

The lack of transparency around the size, characteristics, encoded bias and lack of diversity (Bender et al., 2021) in training data can leave users susceptible to risks and harms. Furthermore, if data about a student is fed into or used to train a system, then there is a risk that some or all of this personal data could appear in other outputs.

There are also issues that are completely unique to general-purpose AI. The problem of inaccuracy is a primary challenge that may never be resolved. Other challenges relate to the effect of AI use on individual autonomy, agency and creativity, as well as relationship development. Ensuring that AI supports teacher–student relationships, rather than replacing or undermining them, will be critical.

Oversight and evaluation

Schools have duties as data controllers, but AI regulation and legislation has not kept up with innovation. This means that there is a lack of clarity about school leaders' duties in relation to procuring and using new general-purpose AI or AI EdTech products. Current support for schools in procuring EdTech looks only at administration technology. This leaves a significant gap in support for decision-making around the use of EdTech products in teaching and learning.



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A holistic look at the intersection between technology, pedagogy and societal outcomes is needed

Through the Everything ICT website (www.everythingict.org/about), the Department for Education (DfE) offers help for schools that are looking to procure technology to support their statutory duties. However, it is unclear which organisations or bodies are responsible for evaluating the efficacy, accuracy or effectiveness of these technologies, or how rigorous this evaluation is. The lack of expert oversight and independent guidance also leaves schools reliant on marketing materials and hype, rather than support that is fit for purpose and proven to be effective.

The oversight needed to ensure that general-purpose AI products, EdTech and AI EdTech are appropriate, necessary and fit for purpose is multifaceted, and should cover both the technology and the effect of its use. In the case of EdTech, this oversight also needs to include an evaluation of the pedagogy on which the technology has been designed, and any improvements in pedagogical practice that a product claims that it can bring about.

We propose a number of areas where oversight and evaluation should include both the technology and the pedagogy. These align with the principles of safety, security and robustness; appropriate transparency and explainability; fairness; accountability and governance; and contestability and redress.

Furthermore, we suggest that a holistic look at the intersection between technology, pedagogy and societal outcomes is needed. This will require collaboration across a range of stakeholders, including school leaders, technologists, regulators, government, teachers, data protection experts and academics.

What's next?

If general-purpose AI is to become a feature of school education, then we must tackle the barriers to understanding the effects of AI, and the data and models used in some EdTech.

The evidence base for the technical and pedagogical efficacy and the social effect of using AI in EdTech – whether for general learning and teaching, for special educational needs and disabilities or for administration – remains limited and requires development.

Furthermore, we need more focus on evaluation and oversight. Better access to EdTech companies' products and training data will enable technologies to be evaluated, supporting transparency. Opportunities for further research, including longitudinal research and randomised controlled trials, would also be beneficial.

The DfE's recent announcements on the evaluation of EdTech and the development of teachers' AI literacy, of which the Chartered College of Teaching is a part, are a welcome start in acknowledging and addressing the gaps in knowledge, evidence, oversight and understanding.

If we are to fully realise the transformational opportunities of AI and AI EdTech, which policymakers and innovators have identified will benefit teachers and pupils alike, then further research and holistic working practice will be needed. We hope that policy, business, academia, and education practice and leadership will come together in the coming months and years to interrogate the technology and its appropriateness to both the sector and pupils' learning outcomes.

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Harnessing AI for better school reviews: Testing the feasibility of AI to improve quality, efficiency and fairness in school inspections

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School inspections, resource challenges and AI's potential

While the focus on generative AI (GenAI) in education and its potential has typically been on its use for school staff and pupils, its promise of bringing radical productivity benefits to complex tasks (Somers, 2023), also suggests the potential to apply this technology to other areas of work, including the work of school inspections. There may be the potential for it to streamline administration and improve the reliability and quality of inspections, with consistency in Ofsted inspection remaining a challenge in England, for example (Bokhove et al., 2023). However, there are questions about the extent to which we can trust AI's outputs (Riley and Bruno, 2024). Ethical concerns, particularly data privacy issues (Madiega, 2019) and the potential misuse of biased or discriminatory insight (Vicente and Matute, 2023), are legitimate. For AI to be feasible in this context, it must add value without affecting quality and reliability.

Exploring AI's potential through a feasibility study

We have carried out a series of experimental trials using commercially available GenAI products on a range of activities across the lifecycle of a school evaluation. Our team ran upwards of 150 tests, using simulated inspections evidence under the UAE's inspections framework. After feedback on each output from experienced inspectors, we iteratively refined the AI prompts until the outputs were at a level that the team agreed was of sufficient quality to be useful to field-based inspections teams. We then conducted a short field test, using some of the prompts in a non-statutory school review, with school leaders' permission.

The early results are encouraging and indicate that AI can provide effective assistance for inspectors in many ways, as evaluated by experienced inspection experts.

Discussion: Three positive predictions about AI's potential in school review

At the simplest level, it is clear that AI's ability to process and analyse vast amounts of data quickly, generate reports, plan inspector deployment and carry out time-consuming tasks can help to improve inspection efficiency. More interesting, though, is what the technology might offer in terms of improving the quality and effectiveness of inspection and school review. Here are three positive predictions for what could be achieved in a short period of time if AI is used to enhance the inspection process.

1. AI will increase school leaders' trust and confidence in inspection by improving reliability and transparency

Where there is a lack of trust in inspections, or the process feels opaque, unfair or monodirectional, there is unlikely to be lasting improvement or buy-in (Leeuw, 2002). Reliability is therefore a crucial factor in earning schools' trust in the process (Nelson and Ehren, 2014). There is a risk that bringing AI into the process could heighten these concerns.

However, any increase in the efficiency with which inspections can be delivered gives inspectors additional time to invest in understanding context, exploring complex issues and building relationships. This could increase trust and credibility and strengthen relationships between inspectors and those they inspect (Leeuw, 2002).

2. AI will improve the validity of inspections by helping more practising school leaders to become part of the school review workforce

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Those applying inspection framework standards must be knowledgeable, skilful and, crucially, credible enough to ensure that the use of these measures is valid.

Inspectors' expertise and credibility increase validity and benefit the schools they work with. Our feasibility study suggests that 'co-pilot'-type solutions – AI that prompts users during the live task of inspection – might help to upskill new inspectors to ensure that their evaluations and judgments are rigorous, robust and fully consistent with inspection methodology. AI can also be used to provide an initial assessment of the appropriateness of lesson or curriculum content against national standards and age-related expectations, checking alignment with statutory regulations.

While human quality assurance by expert inspectors will still be needed, AI scaffolding of this type might support people with excellent education credentials, but perhaps limited or no inspection experience, to participate in inspection much more quickly and effectively than is currently the case.

3. Insights from AI-enhanced inspection will dramatically amplify the potential for school and system improvement

Repeatedly auditing schools does not make them any better at educating children. AI allows us to see a future where the review process helps to drive improvements to school quality, as well as generating greater and more reliable insight for policymakers and governments. We have seen sufficient evidence in our tests to believe that AI can identify patterns and anomalies that human inspectors might miss, providing deeper insights into school performance and system-level effectiveness.

For example, the volume of evidence gathered in a typical school inspection frequently presents a major challenge to inspection teams – so summarisation is essential in making evidence manageable during an inspection. This is a time-consuming process if conducted manually, and important insights and connections may be lost or diluted. AI-supported inspection teams could access these summaries instantly, giving them more time to direct their attention to the judgments and recommendations.

Conclusion

Based on our experimental trials, we are optimistic that AI tools can create substantial productivity benefits and provide different options for resourcing inspections. If we can use AI tools to create more time, space and evidence to inform an improvement-focused dialogue between leaders and reviewers, this is likely to have positive benefits for both parties.

Etio's full report, 'Harnessing AI for better school reviews', can be accessed at https://info.etioglobal.org/ai-in-review-whitepaper

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The importance of student voice in getting AI right for schools

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School leaders are in a precarious position, striving to ensure the best possible futures for their students while being aware of the effect that AI technology is already having on the way in which young people are adapting their study and their aspirations for the future (The Social Institute, 2023).

It is likely that AI will significantly affect the world of work (Forbes Technology Council, 2024), and students are already using AI tools with which school leaders are not sufficiently familiar to be able to make informed decisions over (Cheong, 2024). This article looks at several important considerations for schools about what best practice might look like, through the lens of the student experience.

The activities of the Good Future Foundation are steered by two advisory groups and a board of trustees. One of the advisory groups is made up of students – young people in their final two years of secondary school or first two years of university. They are eager, engaged and committed to make a difference in addressing digital disparity. As they are contributing to benefit students who are much younger than they are, their perspectives focus on the development of AI in educational institutions as they have seen it evolve during the past two years.

The student council presents a variety of world views, based on the locations of their schools and their appetite for cross-cultural programming. They come from a range of countries, including Pakistan, Colombia, the UK, Morocco, Argentina, India and Turkey, and bring their own perspectives to the initiatives that we undertake. The recommendations that they make to schools and to the foundation come from their lived experiences across the world and from schools with a truly diverse level of access to resources and professional development.

The students believe that it is essential not only to involve AI in the academic process, but also for schools to consider the ways in which other members of the school community might be exposed to this technology. Students are starting from their own self-arrived perspective that AI will be front and centre of their educational journeys from school onwards, and essential to the future world of work. Consequently, unless teachers and operational staff have a firm grounding in not just what tools and solutions can do but also how they should be approached responsibly and effectively, they are at a unanimous disadvantage (NVIDIA, 2024). Ultimately, they would like schools to be shaping what best practice looks like, not just in education but also from a professional perspective.

The below recommendations come directly from students who use AI, albeit on a regulated basis.

Using AI tools for report writing

Just as teachers have been able to see how students might be working on tasks differently following mainstream implementation of ChatGPT, students have noted how their teachers might approach administrative tasks. They have seen a particular trend when considering the content of their reports and what they are seeing about their progress in classes. Report writing is standard practice across the board, regardless of where the students are located; from Casablanca to Buenos Aires, teachers report on student progress, attitude and behaviour throughout the academic year to monitor development and make recommendations.

This has not always been the best approach, and many of the students' schools complement report writing with teacher–parent–student conferences, where open discussion and dialogue enables a more fruitful depiction of the term or semester. However, students notice when report writing shifts from a developmental initiative that puts

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the child first to a bureaucratic exercise that can be cut down by using an AI tool.

The recommendation is not to stop using AI to address bureaucratic exercises at school. The student council believes that this should be encouraged, with the right guidance in place. A beneficial alternative could be using an AI tool to give the teacher prompts on what they might need to consider for their students. The example that the students provide is to think about the most beneficial things that a student might need to know about their performance over a period of time, and what they might need to do better.

Students are already using AI tools with which school leaders are not sufficiently familiar

Using AI to generate such prompts means that the teacher can create a framework for addressing each student uniquely, without automation. Using AI to write student reports, on the other hand, is an indication of a less desirable future, wherein AI is solely responsible for who gets what (Harari, 2024). This is what students fear the most about an AI-centric future.

Using AI tools for risk assessment

This was not a task that students came to on their own terms. Risk assessment as a process looks very different in different parts of the world, and I'm taking a UK-centric approach to the definition here. However, the idea of ways in which AI might be used to ensure a more robust system, while saving teachers time and allowing more experiential learning, was something that students championed immensely.

The risk assessment framework can be generated by AI, as can most of the content that populates certain fields. Basic information can be written and populated with a few keystrokes, rather than having to spend time laboriously rewriting documents for school activities. The students' suggestion was to help teachers and administrators to think more creatively and actively about risks that might be associated with an activity. They could use any existing policy or government guidance as a benchmark and then use an AI tool to test how robust the activity might be, detail whether or not there are risks that might not have been considered and, most importantly, get the assessor to engage with the process of writing the assessment more critically.

As with report writing, if risk assessments become a bureaucratic check-box exercise with no intrinsic merit, then they become a means of pushing responsibility and limiting the scope of in-person activities with which young people might engage. AI may be used to reframe this existing paradigm, first by setting up the type of rubric that encourages suitable levels of risk (Charon, 2020), and second by testing the assessor on their ability to think through practical and implementable prevention measures. ›

Eroding the zone of proximal development

Regulating AI has become part of the regular agenda for students when it comes to thinking through what best practice looks like. It is so fully augmented into their day-to-day lives, through the applications that they use, the processes that they put in place to complete work and the ways that they use it for engaging with the world outside of school, that they are finding it difficult to retain the same levels of focus that they might have had before adopting it.

That adoption looks different across the board, from students prioritising professional AI accounts above anything else for which they might have an allowance in any given month, to students who are keen to adopt and experiment with as many free or trial versions of a tool as they can find.

It's taken two years of this level of use for students in the council to realise, independently, that this is affecting their cognitive performance and how they are able to function while studying. Some – though not all – of the council talked through self-imposed regulation because of the noticeable effect that it is having on their zone of proximal development. One student referred to this specifically as 'self-identified brain rot' from not having to think through tasks and complex problems in the same way that they had been doing before the use of AI tools.

What the students are interested in is how teachers might help by guiding them through what best practice might look like. At the moment, students do not think teachers are well-enough equipped (Vodafone Foundation, 2025) to teach them adequately. For students to feel confident that their teachers are able to at least learn with them in this respect, they need to see teachers adopting and using, with thought and care, the tools that are most likely to have an effect.

It would be beneficial for best practice AI technology use in schools to be brought to the forefront

Conclusion

There is a notion that AI use in teaching is undesirable, or deviates so much from standard practice that its use should be concealed and hidden from view. What we are hearing most from students is that it would be beneficial for best practice AI technology use in schools to be brought to the forefront, analysed and demonstrated with students as part of a collaborative process.

Whether this is through report writing or assessing risk, there are plenty of cases where teachers might be able to show their class how they are using the technology to the advantage of the class and the school.

This is an exciting time to be a teacher, but so much hinges on getting these next steps right. I am advocating for students' voices to be heard and considered in the process of this important decision-making.

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Teachers' and school leaders' AI readiness

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Generative AI (GenAI) – labelled a paradigm shift, the fourth industrial revolution, cognitive automation, the algorithmic age, the great disruptor and other terms, depending on the perspective taken – forces us to consider the trajectory it charts for the future of learning: how will tomorrow's students and teachers construct their learning and teaching environments and practices with and around AI?

AI in education

While educators are increasingly embracing AI tools, many have never used it for their schoolwork, or use it only rarely. It is therefore important not to assume that all teachers and schools are prepared and ready. The reasons for this vary, ranging from teachers' technological readiness and misconceptions about AI to ethical concerns, immature AI curricula and a lack of evaluation methods (see Kim et al., 2022; Ng et al., 2023). To efficiently support educators in digital AI transformation, it is essential to understand the challenges they face. While AI is expected to alleviate teacher workload, research suggests that the transition period will require substantial support, resources and flexible timelines (see Luan et al., 2020).

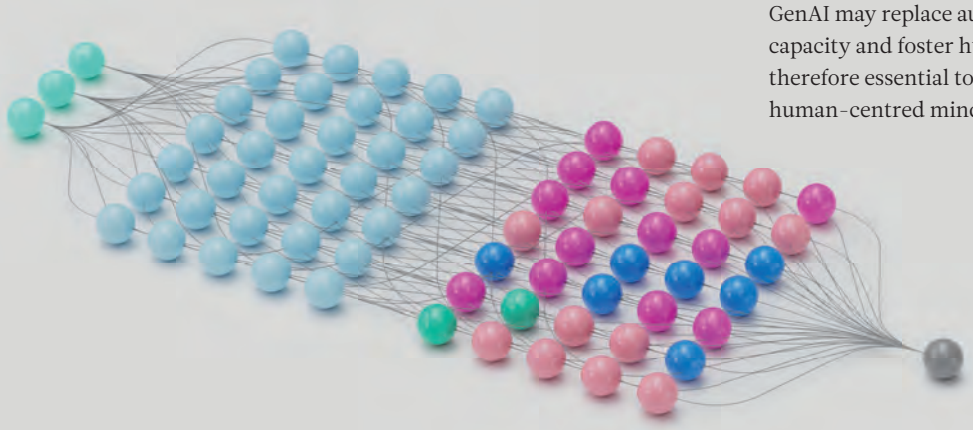
To ensure well-qualified teachers in AI-enhanced classrooms, educators need not only AI-related technological skills (Healy and Blade, 2020) but also a positive leadership attitude and an ethical mindset (Ng et al., 2023), while addressing common concerns, such as the risk that AI will replace the teaching profession (Selwyn, 2019). Human experience must remain at the centre of the educational context. The development of AI competencies should therefore enable teachers to critically evaluate AI technologies (Long and Magerko, 2020) and understand their potential negative effects (Seo et al., 2021).

Our current understanding of AIED

Emerging practices in AI in education (AIED) suggest that AI could enable new ways of teaching, learning and education management. At the same time, AI poses significant risks to students, educators, education systems and society at large, including threats to human agency, systemic data privacy violations and deepening systemic inequalities.

GenAI relies on data mining to train systems, and the large-scale data collection required for the development of these tools may threaten personal data privacy. While human control over data transfers was relatively straightforward in previous generations of AI tools, data mining practices 'behind the design of AI platforms involve actively preying on and exploiting personal data, often without consent' (Miao and Cukurova, 2024). This underscores the urgency of empowering teachers to understand the ethical issues related to their interactions with AI tools, to ensure safe and responsible use.

AI is distinguished from other digital technologies by its capacity to mimic human behaviour. This ability has expanded considerably with GenAI. By facilitating convenient and rapid decision-making, GenAI may replace autonomous decision-making capacity and foster human over-reliance on AI. It is therefore essential to emphasise teacher agency and a human-centred mindset (Miao and Cukurova, 2024). ›



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Key considerations for AIED

UNESCO has been highly active in the field of AIED. Its adopted policy guidance (UNESCO, 2023) promotes four core principles: strengthening human capacities and sustainable development; ensuring equitable and inclusive access to and deployment of AI; requiring AI models to be explainable, safe and harm-free; and ensuring that control and accountability for AI use remain human-centred.

It goes without saying that implementing a human-centred approach requires multi-stakeholder participation. Regulators, AI providers and institutions must share governance responsibilities before expecting teachers to apply AI-related principles in their profession.

Certain aspects of education and society require targeted protection. For example, the effect of AI on children's cognitive development remains largely unknown and is under intense scrutiny (see Williamson et al., 2018). Over-reliance on AI is frequently cited as a concern, potentially leading to decreased motivation to learn, diminished capacity to retain information and a decline in memory abilities (Bai et al., 2023).

Approaches such as human-centred AI, which places human needs, wellbeing and experiences at the core of AI development to create systems that enhance human capabilities, and Human-AI, which integrates human expertise into AI solutions to promote co-learning and co-evolution, help to ensure that distinctively human qualities, such as flexible thinking, social and emotional intelligence, values and ethics, are embedded in AI systems. These approaches also ensure that human perspectives and judgment remain central, preventing malicious misuse.

Important considerations for teachers

Educators' AIED-specific competencies should encompass knowledge and understanding of AI technologies, as well as how these technologies can be effectively integrated into pedagogical practice (Ng et al., 2023). Educators must also be able to critically evaluate the tools that they use within their specific contexts. In this regard, existing guidance is insufficient, leaving both procurers and educators in a challenging position (Hillman et al., 2024; Lindroos Cermakova et al., 2024).

While several international frameworks focus on teacher digital competencies, the first AI-specific competency framework was developed by UNESCO (Miao and Cukurova, 2024). This defines competencies across five dimensions and three progression levels, from 'acquire' to 'deepen' and 'create'. The five dimensions include:

- human-centred mindset
- ethics of AI
- AI foundations and applications
- AI pedagogy
- AI for professional learning.

Professional frameworks can serve as valuable reference points by outlining competency levels, from basic understanding to advanced critical evaluation and ethical leadership in AI. These frameworks are inclusive across diverse educational contexts, acknowledging the varying levels of digital expertise that educators may possess.

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