

Using digital technology to improve learning

Introduction and background

Schools spend an estimated £900 million a year on educational technology, but, as technology advances each year, it can be difficult for them to decide which innovations are worthy of time and financial investment. This latest guidance report from the Education Endowment Foundation (EEF) is designed to support senior leaders and teachers to make better informed decisions about how technology can best be integrated to improve pupils' outcomes. It includes guidance on tailoring school communications to encourage parental engagement and offering more intensive support. The report does not focus on teaching computing or coding, or on questions related to screen time or the use of mobile devices. The sections in this summary correspond to the 4 main recommendations laid out in the report.

Recommendations

Recommendation 1

- The first recommendation in the report is that **schools should consider how technology will improve teaching and learning before introducing it.**
- Although new technology is often heavily marketed by developers and can appear exciting, it can become a solution in search of a problem unless it is introduced in response to an identified need. It is often useful to link the introduction of new technology to wider planning, for example, a review of assessment policy.
- The principles which underpin successful use of technology are the same as those which underpin effective teaching and learning. Therefore, schools should consider the pedagogical rationale for any technology which is introduced. As schools do this, there are a number of questions on which they could reflect. How tightly does it link to the problem which has been identified? For example, does the reading programme under consideration focus on the aspect of reading (decoding, fluency, comprehension) with which pupils are struggling most? Will teachers find it easier to explain, model, assess progress and give feedback? Will learners work more effectively and efficiently with more time on task?
- Wider benefits of technology, for example related to workload or parental engagement, could also be identified as part of the process of providing a pedagogical rationale.
- To date, technology has been most effective when it is used to supplement or enhance teaching rather than to replace it. Where technology is effectively used to improve teaching and learning activities, it is carefully integrated into lessons by teachers and teaching assistants trained in its use, and trained to support pupils to use it effectively.
- A clear plan for the introduction of new technology is essential. Schools must consider what training will be needed, what time and resources are required and what ongoing support will be necessary. Evidence shows that approaches which are implemented as intended with appropriate training and support for teachers are the most effective.

Recommendation 2

- The second recommendation involves **using technology to improve the quality of explanations and modelling.**
- Effective explanations are likely to involve material being introduced in logical steps, with new ideas being explicitly linked to pupils' prior experiences and knowledge. Good models make abstract ideas concrete and accessible, and can provide an opportunity for teachers to model both what to do and how to think.
- Technology has the potential to enhance the way in which teachers explain and model. However, the possible benefits of technology will be determined by the extent to which it is aligned with the wider pedagogical principles of effective explanation and modelling. For example, visualisers could improve the quality of explanation and modelling if they enable teachers to show a wider range of high-quality models than they would otherwise be able to. Alternatively, teachers could use the visualiser to increase the precision with which they explain worked examples, which has consistently been found to increase learning (e.g. in mathematics).
- Introducing a new form of technology will not necessarily change the way in which teachers teach. A good illustration of this is the widespread introduction of interactive whiteboards in the early 2000s. An early evaluation of the 'whiteboard pilot' in primary schools found that the whiteboards did increase the pace and the number of open questions asked. They did not, however, bring about clear improvements in learning.
- In order to use technology effectively, teachers need ongoing training and pedagogical support.



Recommendation 3

- The third recommendation is that **technology should be used to improve the impact of pupil practice**. Ensuring that pupils have repeated and varied opportunities to apply and use new skills leads to success.
- Technology has the potential to increase the quality and quantity of practice that pupils undertake, both inside and outside of the classroom. One example might be a quiz application on a mobile phone or tablet that tests pupils on vocabulary in geography or dates in history.
- Some forms of technology can also enable teachers to adapt practice effectively, for example by increasing the challenge of questions or by providing new contexts in which students are required to apply new skills.
- There is particularly strong evidence related to the use of technology for practice in mathematics, but there is also evidence in other subject areas such as modern foreign languages, English and science. There is, however, other evidence to suggest that alternative forms of additional practice, for example through additional small-group tuition, can be as effective as technology-based approaches.
- More motivated pupils may be better placed to use technology for practice. A recent review suggested that low-achieving mathematics students did not benefit from mathematics tutoring systems. One explanation put forward was that students need to have sufficient prior knowledge, self-regulation skills, motivation and familiarity with computers to gain from the practice opportunities afforded by the technology.
- Technology can be used to support retrieval or spaced practice and low stakes testing. These approaches are based on the premise that we are more likely to remember something if practice is spread over time rather than undertaken in one sitting and that testing one's ability to retrieve information can be an effective way to improve recall. Retrieval and spaced practice both involve revisiting a topic after a 'forgetting gap' in order to strengthen long-term memory. Both are well-supported by evidence.
- Technology can also be used to support pupil practice outside of the classroom. For example, the EEF evaluation of Texting Parents found that regular, short text messages to parents—such as prompts about homework completion or revision for an upcoming test—improved attendance and attainment. Although improvements were small, the cost of the approach was very low.

Recommendation 4

- The fourth recommendation is that **technology should play a role in improving assessment and feedback**.
- High quality feedback will be accurate and clear. It will provide specific guidance on how to improve and it will encourage further effort.
- Technology has the potential to improve both assessment and feedback, particularly in terms of speed and efficiency. However, as with other aspects of teaching, the degree to which its potential is realised will be determined by pedagogy and implementation.
- The way in which teachers use information from assessments, and the way in which pupils act on feedback, matter more than the way in which they are collected and delivered. There is little point in the teacher getting immediate accurate information unless they use it to adapt their teaching accordingly.
- The results from EEF trials demonstrate that technology alone is not enough. For example, the Learner Response System trial looked at the regular use of hand-held

electronic clickers in Key Stage 2 mathematics lessons between 2014 and 2016. In response to questions, pupils could input a response on the handset, thereby providing instant feedback for teachers and pupils. However, the evaluation found that there was no impact on Key Stage 2 results.

- When technology is used to make assessment more efficient and effective, this can help to reduce teacher workload. One example of this is an innovation at St Margaret's primary school in Lincolnshire. Staff use tablets to record verbal feedback over videos of annotated work. Pupils are given 2 verbal improvement points with a photograph of their own work side by side with a photograph of a model text. This innovation was relatively easy for the school to adopt as it was already experienced in the use of tablets.
- Many technological interventions such as the 'intelligent tutoring systems' are designed to provide feedback to pupils following games or activities and to then offer new questions which focus on the errors made. Here again, however, it is the pedagogy and implementation which matter. This is the reason why several programmes evaluated by the EEF have not been found to be effective in improving outcomes.
- One digital programme which has yielded encouraging results is the Accelerated Reader programme. This programme quizzes pupils on their reading to identify books which have the correct level of challenge for them. An EEF study found that Year 7 pupils using the programme made more progress than the control group.
- Effective use of software relies on support from teaching staff. There is evidence that guidance from a teacher or teaching assistant can increase the impact of a programme. Teachers will need to monitor pupils' use of the programme and their progress, adjusting their teaching accordingly. This can be facilitated by programmes which offer dashboard analytics.

The full document can be downloaded from:

<https://educationendowmentfoundation.org.uk/tools/guidance-reports/using-digital-technology-to-improve-learning/>