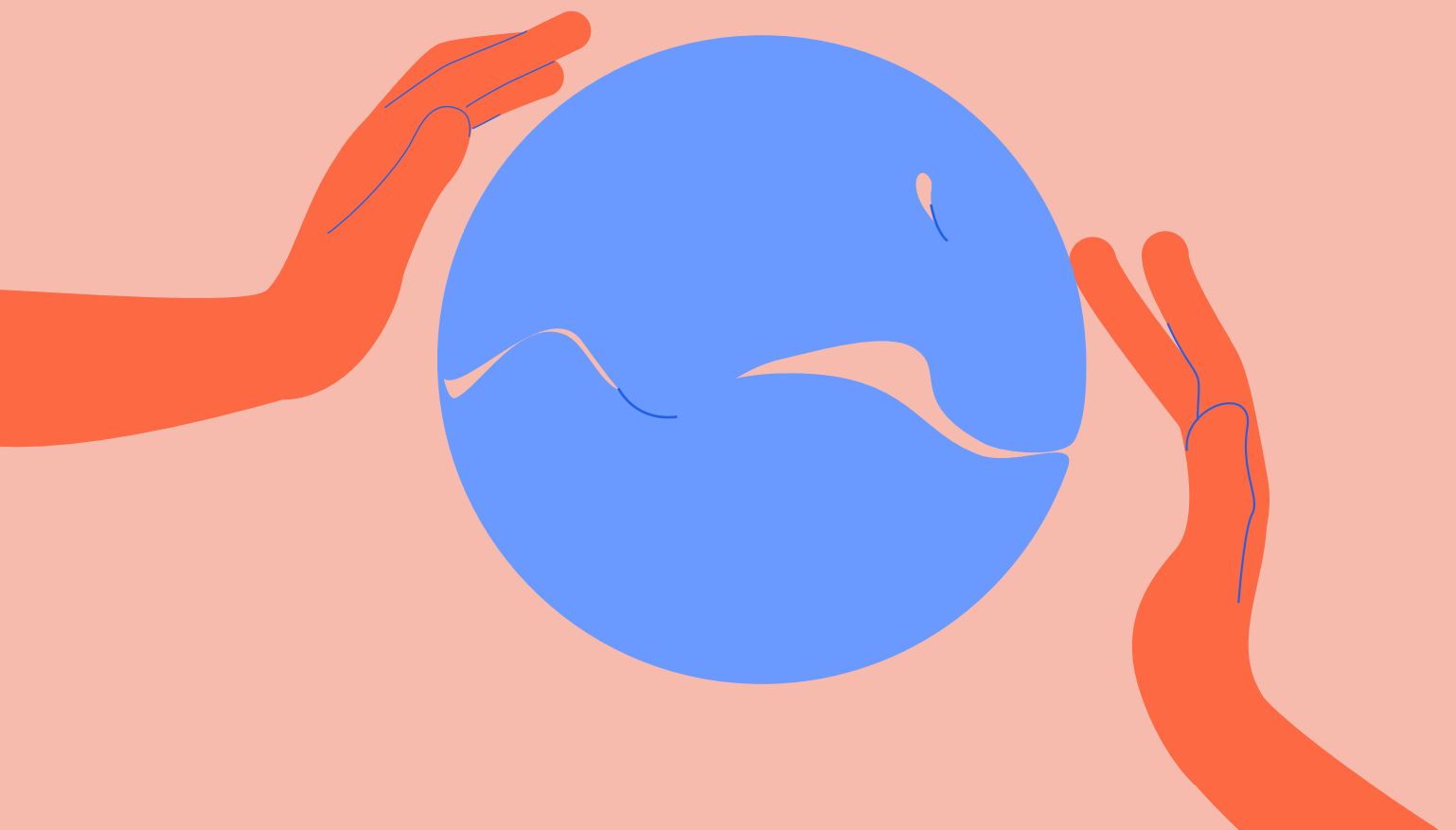




# Edtech in science education - building back better in a post pandemic world

Insights from science teachers,  
school leaders and science  
education organisations



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# Welcome

Building back better. That three-word phrase is becoming tarnished with overuse, but for this moment in time it sharply sums up the challenges faced by all of us who work in education.



The pandemic has swept aside every aspect of normal life and forced us to adapt rapidly to a different world.

It's the same in science education.

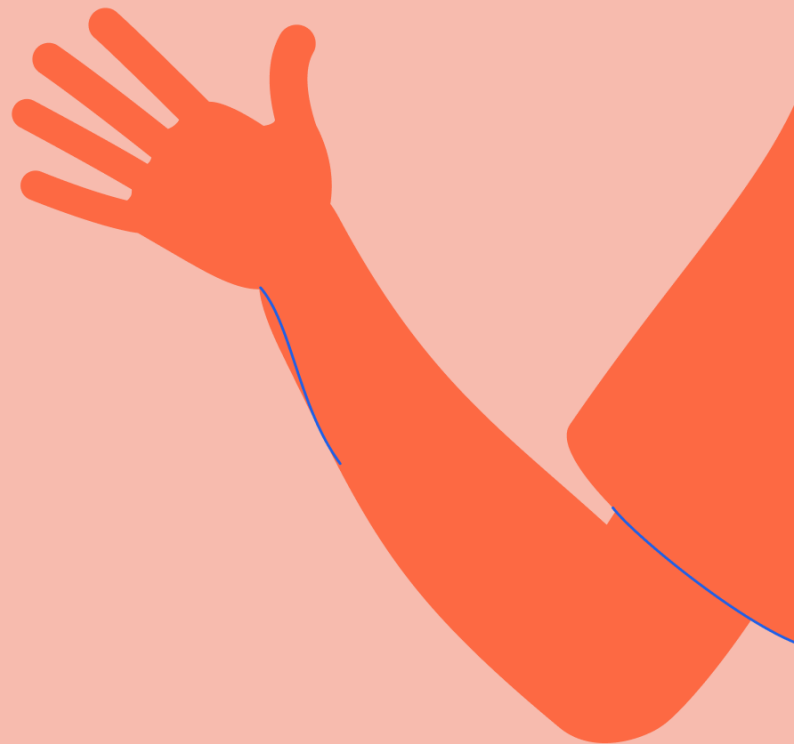
As the creators of a learning app used extensively in schools, and especially by science departments, we have had many discussions with science teachers, parents and students about their science learning. We've heard their concerns about learning loss and their hopes and fears for the year ahead and want to play our part in building back better.

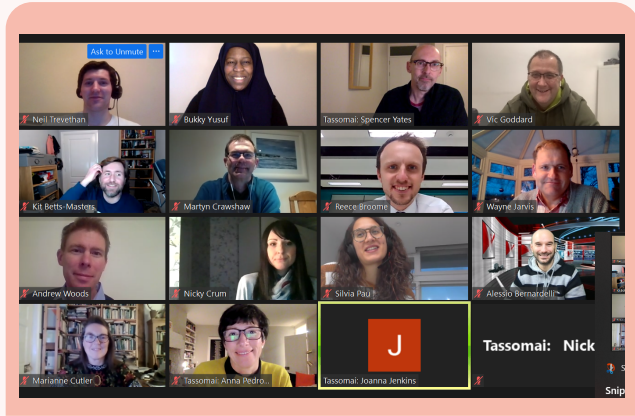
That's the reason why we hosted our first round table discussion. We thought it important to gather together representatives of the education ecosystem - teachers, leaders and representatives of key education and edtech organisations - so that together we could develop a shared understanding of how schools have adapted to the challenges of covid over the past year, examine the role currently played by edtech in science teaching, and, most importantly, look ahead to a post-pandemic world in which our experiences of the last 12 months can be used to ensure that science teaching next year can come back stronger than ever.

The resulting round table was a wide-ranging, fascinating and insightful discussion which produced important insights for schools and the wider education system. We hope you find it valuable.

**Murray Morrison,**  
**Founder and CEO, Tassomai**  
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# Introduction





# Introduction

This report is based on the key themes and insights that emerged out of an online round table discussion hosted by Tassomai on Monday 8 February 2021. It was attended by:

Bukky Yusuf, Senior Leader and Science Lead, Edith Kay School, London and Co-Chair, DfE EdTech Leadership Group (round table chair)

Alessio Bernardelli, Professional Practice Coach, Institute of Physics

Kit Betts-Masters, Director of Learning - Science, Abbeyfield School, Northampton, and founder of YouTube channel Gorilla Physics

Reece Broome, Head of Online Learning and Tassomai School Lead, Torquay Academy, Torquay

Martyn Crawshaw, Head of Sciences, Milburn Academy, Inverness

Nicky Crum, Science Improvement Lead, STAR Academies, Blackburn

Marianne Cutler, Director, Curriculum Innovation, the Association for Science Education

Vic Goddard, Co-principal, Passmores Academy, Harlow

Wayne Jarvis, Senior Network Education Lead, STEM Learning

Silvia Pau, Assistant Programme Manager, Edtech, Nesta

Neil Trevethan, Education Projects Manager, British Science Association

Andrew Woods, Product Manager, GCSE Science, Pearson

Spencer Yates, Head of Marketing and Communications, Tassomai



A year of adaptation:  
Science teaching  
during the pandemic

# A year of adaptation: Science teaching during the pandemic

Science teaching came under greater pressure during the pandemic than the other core subjects, maths and English. A senior leader told us that lockdown had made science – a “poor relation” of the core subjects – “shout a little louder”.

“We have put a lot of provision in to make sure that staff feel more confident about delivery and making sure that teaching quality is first class. If it isn’t, the children won’t access the materials.”

Making materials relevant and exciting to students has been a key focus, with the onus on engaging children without ticking every curriculum box. For instance, links with Helen Sharman – the first UK astronaut – were used to create a project on the confinements of space travel which saw students devise a diet and fitness plan fit for a cosmic traveller.

Re-ordering the curriculum to focus on non-practical elements that could be delivered remotely also helped departments to ensure learners could progress in science.

As it was impossible to conduct science practicals in the usual way during the past year, video resources and worksheets took their place. Virtual practicals and teacher demonstrations became the norm and participants felt they could enable the same thinking approaches using effective dialogic teaching strategies. There were also some benefits of virtual practicals encouraging more individual responsibility compared to a real-life practical where one student might be doing the work with five students looking on and not playing an active part.

Well planned, well thought out remote learning can work well, but it does create a greater demand for resources than in the classroom. We heard that in Scotland science teachers created a spreadsheet containing a full list of resources they had used for certificate level science and then shared it nationally through the Institute of Physics. Similar resources have been developed by Twitter-based education communities. “The aim has got to be ‘curate, not create’”, said one leader. “If you write things from scratch therein lies madness. We have to work together.”

# The role of edtech



# The role of edtech

Most agreed that teachers and leaders had rapidly become highly skilled in the use of edtech. However, it was important science teachers and leaders didn't become bewitched by the latest products. One department head explained: "I think we are still in a Betamax versus VHS style argument about what is the most effective platform. I'd say make the best use of what you have got and wring as much value as you can from it and don't keep looking for new apps."

Many found that the change from in-person teaching to online threw up unexpected challenges and opportunities for skills development. Major organisations have stepped up to support the profession in this and many other areas of concern. For example, science education organisations such as the Association for Science Education, Institute of Physics, STEM Learning and Royal Society of Chemistry have offered support including remote training, webinars and podcasts to support teachers on the use of technology to deliver remote learning. Participants also highlighted how important this was to help support newly qualified science teachers.

"A lot of our team realised that, while they were very strong in the classroom, online was a completely different ball game," said one senior leader. "Our current focus is, to quote from Doug Lemov's new book *Teaching in the Online Classroom - Surviving and Thriving in the New Normal*, to 'dissolve the screen', trying to make the online learning experience as close as possible to a real-life classroom."

"Modelling has become a huge part of what we do now so we use visualisers in every lesson," he added.

"We're trying to engage the student as much as we can, either through the camera or the clever use of the chat or raised hand function. I can model something with the visualiser and then get everyone to load their answer, have a big reveal and then unpick them."



# Access to technology

It was suggested that some edtech providers and some educationalists had been “putting the cart before the horse” with technology and that they didn’t pay enough attention to the fact that many families aren’t well equipped with the latest laptops, tablets and smartphones.

One said that most students at his school could only access online learning through aged mobile phones, and very few had ready access to a laptop at home. “During lockdown 1 we decided to put all the core lesson resources on paper and sent packs home once every three weeks and we avoided setting core compulsory learning online, while making sure that students could still access apps like Tassomai and Hegarty Maths.”

“There has to be a reality check on what technology exists in the home,” he added. “It may be easier for middle class families to afford a new laptop if a child needs one but for other families it’s a struggle. We need to make sure that we are taking everybody along on this,” he said.

Government schemes and sourcing by individual schools and trusts had gone some way to plugging that technology gap but a dose of realism was still needed, delegates agreed.

Some added that edtech tools designed for the classroom were not necessarily optimised for home-based remote learning where the latest technology might not be available. Nesta reported that they were sharing parent, teacher and student feedback with edtech companies to help them refine their tools and platforms, adding that edtech organisations needed to design their products with the needs of the most disadvantaged students in mind, rather than assuming that what will work for the “average” student will work for all.



# Parental expectations and feedback

Many felt that feedback had become even more important during the past year.

One leader said that when parents were polled during the two school lockdowns the importance of feedback for students was a key finding. "Parents are trying to motivate students to stay online and learn, but if they are not getting that feedback, motivation disappears rapidly," he said.

He suggested that edtech learning platforms kept students engaged because they received constant feedback - a feature that reassured parents that their children were being taught. The "concreteness and reassurance" that progress through an edtech platform can give students in a time of anxious uncertainty was also highlighted.

Another contributor observed: "We have found that students had been lacking that personalised feedback so we have a one-hour drop-in hosted by a science teacher once a day on Google Meet. We're also using Mote voice notes to provide spoken feedback on work."

One science department is collating feedback from every edtech learning platform used by students and then sending parents a visual progress report. The approach has helped to drive up engagement in online learning by more than 20 per cent.

The suggestion by Ofsted that assessment was a bridge between teaching and learning in remote learning was raised several times. Many felt that one of the chief merits of many online learning platforms was their capacity to assess with pinpoint accuracy. That will help science teaching as pupils return to the classroom, said one science teacher, who added: "I think these platforms will have their place when we do get back into school. I think students appreciate that online learning is really positive for building recall and knowledge and that it can add to their skills, helping them to become more digitally literate learners in the future."



# Looking ahead: Advice for science teachers planning for September 2021





# Looking ahead: Advice for science teachers planning for September 2021

Everyone agreed that teachers and leaders had learned a huge amount over the past year, evaluating practice and skilling up staff and students in a range of ways, and that this would be a strong foundation for the future. Five themes emerged as key for science teachers preparing for September 2021:

**1. Assessment is key.** Assess knowledge and skills through good quality diagnostic teaching that includes assessment. Don't waste time on recall practice to see where students are - that can be the job of edtech partners. Focus teaching time on quality content delivery and super-focused feedback, therapy and intervention.

**2. Brush up your practical skills.** Support new teachers with no experience of running practicals. Remember the Year 8s, who have yet to do a secondary practical, and the Year 10s who have probably forgotten how to use a Bunsen burner properly. Plan for building progression in practical skills and make sure the purpose of every practical activity is clear.

**3. Think about curriculum design.** There will be many students who are not up to speed with the curriculum, as well as SEND students who will need additional support. Also be aware that a small minority of students may have progressed far beyond the curriculum and risk overshooting exam mark schemes by knowing too much. Refocusing on exam technique and revisiting concepts and ideas that won't have been fully understood due to a lack of practical experience and real life science teaching will be important.

**4. Refresh scientific literacy.** Students may have forgotten key vocabulary. Make it obvious to students what words mean and how stems are derived so that when it finally comes to exams they will have some fluency in scientific language.

**5. Curate useful resources.** A 'pool' of online science resources, including tutorials, vlogs and CPD that have helped science teachers enhance online teaching and learning will help science leads, heads of department, teachers and trainee teachers really prepare for the upcoming year.

It was felt that in the past year edtech had proved its value in helping science learning and this meant it was set to play a greater role in education. Technology's ability to give teachers a way of instantly assessing whether the class 'got' a learning point before moving on, would be invaluable.

The ability of edtech to provide schools with a dashboard of student information to inform parent-student conversations was also highlighted.

"Remember what has worked well in terms of remote education and blended learning and use that learning in your delivery of curriculum content in the future," urged one, who hoped that better science teaching would be one of the legacies of the pandemic.

"I think these efforts will create a massive legacy for our profession. I'm really looking forward to being a part of it."

# Conclusions



# Conclusions

Major themes to emerge from our discussion included:

- The pandemic has challenged science educators but they have shown their mettle; the innovation and learning that has happened in the past year will help them build back better and also create more digitally literate students.
- Feedback – and parental support – is vital to maintain student engagement. Edtech platforms are in a good position to facilitate this.
- Edtech platforms will continue to play an important role in blended learning well into the future, building and reinforcing student knowledge and recall in science while face-to-face learning - and practical science - gets back up to speed.
- Many households have no or limited access to up-to-date technology so edtech developers and schools need to take this into account in their planning for remote learning. Ensuring that all students, including those from disadvantaged homes, can access learning with 'legacy' technology is an important consideration.
- Science practicals must be a focus of attention over the next few months and years. Educators should carefully plan for the building - and rebuilding - of practical skills and ensure that the purpose of every practical activity is clear.
- Collaboration between teachers, sharing resources, advice and support, is increasingly important for efficiency because online and blended science learning is so resource hungry.



# Links to recommended resources

## **Research evidence-informed resources for effective teaching of difficult ideas, embedded formative assessment and adaptive lesson planning in Key Stage 3 science:**

<https://www.york.ac.uk/education/research/uysel/research-projects/bestevidencescienceteaching/>

and

<https://www.ase.org.uk/news/best-steps-brand-new-free-ase-resource-gcse-science-teachers>

## **CPD resources on planning for effective practical work:**

<https://www.ase.org.uk/good-practical-science-%E2%80%93-making-it-happen>

## **GCSE core practical video resource:**

<https://www.pearson.com/uk/educators/schools/subject-area/science/unbeatable-support/support-from-pearson/gcse-core-practical-videos.html>

## **Physics resources spreadsheet:**

<https://docs.google.com/spreadsheets/d/15DtwuoncxEjVjpE7mWv73sCKsiEAiUkvnjYJZ40StjM/edit>

## **Guidance on what's working well in remote education:**

<https://www.gov.uk/government/publications/whats-working-well-in-remote-education/whats-working-well-in-remote-education>

## **Doug Lemov's new book Teaching in the Online Classroom - Surviving and Thriving in the New Normal:**

<https://www.educationnext.org/a-survival-guide-for-distance-teaching-book-review-lemov/>

## **STEM resources, CPD and enrichment activities:**

[www.stem.org.uk](http://www.stem.org.uk)



## About Tassomai

Tassomai is an intelligent learning program that raises attainment in secondary education. With a game-informed design, Tassomai works by giving students personalised daily practice activities, identifying learning gaps that can be quickly closed by teachers through intervention strategies. More than 500 schools now use Tassomai as a homework tool, with over 250,000 students benefiting from the software. Parents can also sign up as private subscribers.

For more information about Tassomai and to set up a free 5-week school trial visit: [tassomai.com/schools](https://tassomai.com/schools).

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