

# Guidance for remote teaching drawn from the learning sciences

---

## What can research and experience tell us about effective remote teaching?

The COVID-19 pandemic has necessitated a transition to remote teaching, and this article offers some advice for making that transition more successful. However, it should be noted that the pandemic does more than just necessitate direct changes to teaching practice: it has other implications for learning as well. In particular, without physically attending a school, students are not being directly exposed to the face-to-face supports that can help regulate their learning. This might mean for some students that staying engaged with schoolwork will be more challenging. Additionally, students' home circumstances are likely to have a greater effect on their learning. There are a range of resources available that can address many of these concerns, and links to some of these are included throughout this document.

This document is designed to support teachers in their construction of remote learning experiences. These ideas are general, applying across subject areas and age groups, and are drawn from research on online teaching and general principles of learning, and from the writings of educators. There are four major points, and a concluding comment about professional judgement and critical reflection.

### 1. Trust your expertise

The important word in “remote teaching” is *teaching*. Although the modes of communication are different, students can still do all the things students need to do: read, listen, and watch explanations, solve problems, have discussions, ask and answer questions, and so on. Therefore, our overarching advice for teachers is simply to have confidence in

your existing teaching expertise and apply it to the new challenge. After this first point, the other advice that follows is intended simply to offer some considerations and ways of thinking for teachers to work with in doing that.

## **2. Use a mixture of explanations, exercises, and feedback, even when teaching asynchronously**

Often, much of remote teaching is done asynchronously, without real-time interaction between students and teachers. For example, students commonly spend a lot of time watching explanatory videos. However, even in purely asynchronous teaching, simple exercises and feedback activities can be used to break up the monotony and improve learning.

One approach is to pause regularly for brief exercises. Students might be asked to write a brief reflection on a key idea, or generate their own example to illustrate a concept, or be given a short quiz. Exercises reinforce learning, but they also help attention. They can break the monotony and serve as a simple reminder to attend (“something changed, I should watch”). They can also help students to self-monitor and self-regulate (“this quiz is really hard, I must have zoned out; maybe I should take a short break or start taking notes”)<sup>[1]</sup>. (See SLRC PEN Principle #9 – *‘Active Recall Trumps Passive Review’*).

To enhance exercises, simple feedback can also be given, even in asynchronous teaching. Anything that helps a student to judge the quality of their work and understanding what they need to do to improve can be considered feedback. One effective feedback strategy is simply to talk through a model response after students have had a chance to attempt an exercise. Even though this kind of feedback is non-interactive, experiments show that it enhances learning<sup>[2]</sup>. For advanced students, scaffolding can be given before (or instead of) full feedback, with exercises being followed by hints or additional prompting questions rather than a discussion of model answers or performances<sup>[3][4]</sup>.

When teaching remotely, just as in traditional teaching, there should be a good mixture of explanations, exercises, and feedback. (See SLRC PEN Principle #7 – *‘Mix Up Practice Tasks to Boost Performance’*). There is no simple answer here, no magic number of minutes for an attention span—sometimes people struggle to sit through a five minute talk, and at

other times they can watch a movie or football match intently for hours. The ideal mix and timing of explanations, exercises, and feedback, likely depends on the age and ability of the learners, on the nature of the material, and on the purpose of the lesson. Each teacher should use their judgement and their understanding of their context to introduce enough variety to boost attention without sacrificing coherence. (See SLRC Remote Learning Tip #1 – *‘Promoting Attention’* and SLRC PEN Principle #6 – *‘Multitasking Impairs Memory and Learning’*).

### **3. Within a block of explanation, use visualisations and examples**

#### **Using visualisations**

Wherever appropriate, verbal explanations should be supplemented with visualisations, such as diagrams, graphs, timelines, flow charts, and so on. Basic research has found that people can cope with a greater amount of information if some of it is given as words and some as images<sup>[5]</sup>, and applied studies consistently find that visualisations improve understanding of concepts<sup>[6]</sup>. Visualisations also add variety that is likely to improve attention. (See SLRC PEN Principle #2 – *‘Visual Images and Spoken Word Mix Well’*).

Keep in mind that visualisations should be relevant and contribute to explaining the material. For example, in a lesson on the physics of lightning storms, a diagram of the features of thunderclouds would be relevant and helpful, but a dramatic photo of a thunderstorm might not be<sup>[6]</sup>. A dramatic picture might make things engaging, but it would be a mistake to fill a presentation with such pictures just for the sake of having visualisations. Research suggests that the main benefit of visualisations comes when they serve an explanatory purpose.

Whether you are using a visualisation or not, try not to display lots of text on the screen while you are also speaking. Psychologically, reading while listening is the same as trying to follow two conversations at once. Provide a written explanation, or a spoken one, but avoid using both at the same time<sup>[6]</sup>. (See SLRC PEN Principle #1 – *‘Written Text and Spoken Word Don’t Mix’*).

### **Using examples**

Another way to add variety is to provide concrete examples that illustrate concepts you are explaining. Even a single concrete example can greatly improve students' understanding of an abstract concept. For difficult concepts, providing two or more differing examples can be especially powerful<sup>[7]</sup>. For example, if you wanted to teach someone about the essential features of mammals, using the examples of cows, whales, and bats (differing examples) would likely be more effective than using the examples of cows, horses, and sheep (similar examples), or using just one example. (See SLRC SSRL Strategy #6 – *'Make It Concrete'*).

#### **4. When recording a video or audio explanation, draw attention to natural breaks in the material and encourage students to pause and rewind as needed**

Pauses allow students to process what they have just attended to and also to reflect on how well they are engaging with the material. Experiments with learning from video suggest that pausing at natural points (such as changes of topic) can improve retention and understanding<sup>[6]</sup>. It is likely also helpful to directly tell students that they can pause and rewind as needed, and to remind them of that from time to time.

### **Conclusion**

To conclude, it is worth reiterating the first point. Remote teaching is still teaching, and teachers know how to teach. The advice here, like elsewhere, should be taken as food for thought and be treated reflectively and critically, and this is especially the case with respect to remote teaching, an area where technology continues to change rapidly, and where a specific research base is not yet well-established. As always, teacher judgement will be crucial, both in adapting ideas from research to specific student groups and contexts, and in discovering and developing new effective practices.

### ***Further Reading and Resources***

- [Learning to Teach Online: Understanding & Optimizing an Online Learning Experience](#) — Article by Elizabeth Syben King, in *Medium*.

- [Tips and Tools for Teaching Remotely](#) — List by Richard Byrne, PracticalEdTech.com.
- [Evidence for Learning](#) — Evidence-informed advice for teaching and learning during the COVID-19 pandemic.
- [The Learning Scientists](#) – A website offering advice to teachers based on principles discovered in cognitive psychology and other learning sciences.
- [Designing Multimedia Instruction to Maximize Learning](#) — Cognitive Psychologist Richard E. Mayer discusses principles of learning from video.
- The Science of Learning Research Centre – PEN Principles

### **References**

1. Bjork, R. A., Dunlosky, J., & Kornell, N. (2013). Self-regulated learning: Beliefs, techniques, and illusions. *Annual Review of Psychology, 64*, 417-444. doi: 10.1146/annurev-psych-113011-143823
2. Metcalfe, J. (2017). Learning from errors. *Annual Review of Psychology, 68*, 465-489. doi: 10.1146/annurev-psych-010416-044022
3. Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*, 81-112. doi: 10.3102/003465430298487
4. Finn, B., & Metcalfe, J. (2010). Scaffolding feedback to maximize long-term error correction. *Memory & Cognition, 38*, 951-961. doi: 10.3758/MC.38.7.951
5. Baddeley, A. D., & Hitch, G. (1974). Working memory. In Bower, G. H. (Ed.), *The psychology of learning and motivation* (pp. 47–89). Academic Press. doi: 10.1016/S0079-7421(08)60452-1
6. Mayer, R. E. (2017). Using multimedia for e-learning. *Journal of Computer Assisted Learning, 33*, 403-423. doi: 10.1111/jcal.12197
7. Gick, M. L., & Holyoak, K. J. (1983). Schema induction and analogical transfer. *Cognitive Psychology, 15*, 1-38. doi: 10.1016/0010-0285(83)90002-6