



## Make it Stick Principles

### Interleaved, Spaced and Varied Practice

Spacing practice by allowing time to elapse between sessions makes the practice more potent, producing stronger learning and memory. Interleaving two or more subjects during practice provides a form of spacing and can improve your ability to discriminate later between different kinds of problems and select the right solutions. Like interleaving, varying practice helps learners develop an ability to assess changing conditions and adjust responses to fit. Arguably, interleaving and variation help learners reach beyond memorisation to higher levels of conceptual learning and application, building more rounded, deeper and more durable learning.

- ★ Mix up the order of practice problems for greater retention
- ★ Plan starter activities based on content from previous learning
- ★ Design learning sequences which factor in time to re-teach and review content
- ★ Focus less on revision at the end & more on reviewing during the learning sequence
- ★ Use cumulative tests and quizzes throughout the lesson/lessons
- ★ Explain the evidence behind the method so that children understand how this approach is helping them

Beware! This strategy does feel 'clunky'! Massed practice 'feels' more productive, but remember- at best this might develop fluency and NOT mastery. We must persist with this strategy in order for it to be productive.....apply a **growth mindset!**

### Calibration

It is important to avoid illusions of knowing by calibrating judgements to verify what children really do know versus what you think they know. Do not make the mistake of dropping material from practice once they have got it correct a few times. If it is important, it needs to be practiced, and practiced again. The best strategies for this are **quizzing** and **corrective feedback**.

### Elaboration

The process of finding additional layers of meaning in new material- relating the material to what you already know. Eg. Explain it to somebody in your own words, or explain how it relates to your life outside of the classroom.

### Generation

An attempt to answer a question or solve a problem before being shown the answer or the solution. By puzzling through you are far more likely to learn and remember the solution than if somebody first sat you down to teach it to you.

### Quizzing- Low Stakes Testing

Practice at retrieving knowledge or skill from memory is a potent tool for learning and retention. Simply including one test (retrieval practice) in a class yields a large improvement in final-exam scores, and gains increase as the frequency of practice increases. After an initial test, delaying subsequent retrieval practice is more potent for reinforcing retention than closely-spaced practice, because delayed retrieval requires more effort. Spaced retrieval produces knowledge that can be retrieved more readily, in more varied settings, and applied to a wider variety of problems. The more cognitive effort it required for retrieval, the greater the retention results.

Here are lots of different ideas for quizzing:

- ★ What's your favourite BIG idea?
- ★ Re-write in your own words
- ★ Self-quizzing
- ★ Reviewing the learning
- ★ Flashcards
- ★ True or false questions, and justifying
- ★ Recording 10 facts about the learning
- ★ Writing a summary

### Making Mistakes

We can deepen our own and our students' understanding of mistakes, which are not all created equal, and are not always desirable. After all, our ability to manage and learn from mistakes is not fixed. We can improve it.

★ 'Aha' mistakes are a positive type of mistake, but one that is harder to strive or plan for. This happens when we achieve what we intend to do, but then realise that it was a mistake to do so because of some knowledge we lacked which is now becoming apparent.

★ Stretch mistakes are positive. If we never made stretch mistakes, it would mean that we never truly challenged ourselves to learn new knowledge or skills. Our zone of proximal development (ZPD) is the zone slightly beyond what we already can do without help, which is a fruitful level of challenge for learning.

★ Sloppy mistakes happen when we are doing something we already know how to do, but we do it incorrectly because we lose concentration. It signals an opportunity to enhance our focus, processes, environment, or habits. Sometimes sloppy mistakes can be turned into 'aha' moments.

★ High stakes mistakes are performance events rather than learning events. We need to seek to minimise mistakes and maximise performance in these events. How we do in these events gives us information about how effective we have become through our hard work and effort. We want to put processes in place to minimise high-stakes mistakes.

### Mnemonics & Memory Palaces

Effortful learning builds new connections and mental abilities. Evidence suggests the path to expert performance may rely more on discipline and persistence than on genetic gifts. Memory athletes using mental tools for organising large bodies of information are now performing astonishing feats of recall. In sum, our intellectual abilities are to a considerable degree ours to shape. Learners who adopt a **growth mindset** and show grit prove more successful in school and in their later pursuits. Two effective strategies for this are the use of **mnemonics** and the building of **memory palaces**.

A **mnemonic** is a system such as a pattern of letters, ideas, or associations which assists in remembering something. A **memory palace** is an imaginary location in your mind where you can store mnemonic images. The most common type of memory palace involves making a journey through a place you know well, like a building or town. Along that journey there are specific locations that you always visit in the same order.

*Children and lifelong learners alike will benefit from structured learning that includes spaced and interleaved retrieval practice, elaboration, generation, reflection, and use of mnemonic devices. Teachers should explain how learning works, teach learners how to study, incorporate desirable difficulties in the classroom, and make retrieval practice a cornerstone of student learning.*