

In “the problems” document I looked at a number of the reasons why embedding learning is so hard for low attaining learners.

In this, “the solution part 2 - a more tightly spiralled curriculum” document, I explain how returning to teach topics more than once per year, enables teachers to increase the pace of learning for low attaining learners.

In “the solution part 1 - retrieval practice” I showed how, when teachers “think outside the lesson box”, they can ensure more learning becomes embedded learning using retrieval practice. However retrieval practice won’t always work well. If the teacher has tried to teach “too much” or “too hard”, teaching won’t become embedded learning. This document is about how, when and what to teach so that retrieval practice does ensure that teaching becomes embedded learning the vast majority of the time.

The solution part 2 - a more tightly spiralled scheme of learning is, if you will, a “spiral of gently rising expectations” as opposed to a traditional scheme of learning with “high expectations”. It requires four rules to be applied in conjunction:

1. teach only a “small bite” from a topic at one time,
2. ensure that the learner has all the pre-requisite skills before teaching the “small bite”,
3. ensure the learner embeds their learning of the “small bite” over time, using retrieval practice and giving feedback if necessary,
4. only return to teach more on that topic once the “small bite” has been mastered.

The explanation for each rule overlaps with the others.

Instead of teaching “one large bite” of learning on a topic each year, break it down into a few “small bites” of stand alone learning. Before teaching the first bite, use assessment for learning to check that the learner has “mastered” all the pre-requisite skills - this is also called mastery learning. Another way to say this is that the pre-requisites skills should form firm foundations for future learning. The assessment for learning can be done by one or more questions asked and answered or because we know that retrieval practice has embedded the pre-requisite learning.

As the learner does retrieval practice, as long as any necessary feedback is given, the learner will build a “chunk” in long term memory. The chunk is a number of connections which enable the learner to more easily answer similar problems. Provided the retrieval practice questions are similar but different, this chunk will be able to replace some of the working memory requirements of the problem.<sup>1</sup>

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<sup>1</sup> Gobet, F. and Lane, P. 2012. Chunking mechanisms and learning. In N. M. Seel (Ed.), Encyclopedia of the sciences of learning. New York, NY: Springer

When the teacher returns to teach more on the topic, the learner will have more working memory capacity available - it will be easier for the teacher to teach and the learner to learn. The long-term memory can then begin to form chunks from the pre-requisite skills' chunks i.e. chunks of chunks. New skills may be learned, which otherwise could not be, because working memory would, without the chunks or chunks of chunks, become overloaded.

Rather than an explanation based on machine learning, as Gobet and Lane's is, we can also understand this in two more familiar ways.

From the teacher's perspective if the "large bite" of learning, which might in the past have been taught once a year<sup>2</sup>, is broken down into 3 "small bites" of learning, we find each bite easier for the teacher to teach and the learners to learn.

Another way to look at this is from the learners' perspective. At the start of the year the learners may have thought of the 3 bites of learning as "OK", "hard" and "too hard". Each time the learners return to learn the next bite, the recently learned bite has become "easy" and the bite to be learned next seems "OK".

We have made learning "new learning" easier, by moving away from an annual scheme of learning. We have increased the pace of embedded learning. Learning that was previously forgotten, will now no longer need to be taught next year. Next year we can teach more, harder, learning.

By doing assessment for learning we, hopefully, are not teaching "too hard", by moving away from an annual scheme of learning to a "more tightly spiralled scheme of learning" we hopefully are not teaching "too much". If the teacher is trying to teach "too hard" or "too much" the feedback will let the teacher know. If feedback is required frequently or feedback doesn't lead to learners' progress, the teacher will know that they have "bitten off more than the learners can chew". Moreover the teacher will be constantly learning what works for the learners in their class - so feedback will be excellent, non-threatening teacher training.

Teaching several "small bites" of learning on a topic, spaced over the year makes it easier to fade scaffolding, so that the learner can learn to solve their practice questions independently.

One way to do this is for the learners to do retrieval practice questions where both the question and the scaffolding are given. Once the learners have sufficiently embedded the skill with scaffolding, the teacher can then teach the learners to do the same type of questions without scaffolding.

Another way to fade scaffolding over time, is ensuring that the pre requisite "small bites" have been practised enough that chunks have been formed in the learners' long term memory. These chunks become the learners' internal scaffolding - the learner doesn't need us to provide any exterior scaffolding.

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<sup>2</sup> quite probably once a year for several years in a row

By teaching several “small bites” of learning on a topic, spaced over the year we gain other advantages too:

- learners are more likely to realise that they are making progress, especially if we start new teaching by reviewing the pre requisite skills. When the teacher says “last time we learned ...”, the learners are more likely to genuinely find the review work “too easy” rather than tell us that “it’s too easy” to cover their feelings of anxiety and inadequacy;
- learners who have sporadic attendance are very unlikely to miss all the learning episodes on one topic, so they are less likely to develop learning gaps.

By teaching “small bites” of learning, more frequently it follows that we will move away from thinking of “the lesson” as the unit of learning. We can use Dylan Wiliam’s “learning episodes” to describe the time frame that teaching and learning happens within. An hour lesson might be made up of

- one small bite of new learning, some retrieval practice and some pre-assessment ready for future lessons,
- or two small bites of learning and some retrieval practice,
- or a small bite of learning and some retrieval practice.

Once we think of learning episodes we have other advantages too:

- all learners will make progress in the lesson, a learner who takes much longer than her peers to do an activity will still be able to complete one learning episode;
- we reduce the “attention span” required from learners from perhaps an hour to perhaps 20 minutes;
- when we have made a mistake and tried to teach “too hard” we have only spent 20 minutes, not 60 doing so;
- we are more likely to feel we have time to “fill learning gaps”.

If the idea of splitting up topics into small bites of learning, fills you with “work-life balance horror” you may want to look at how we have done this with timely practice.<sup>3</sup> timely practice was written to make using retrieval practice and a more tightly spiralled curriculum with groups of low attaining learners easy.

If you are lucky enough to be able to have a sufficiently small and biddable group of learners who can do retrieval practice without timely practice and without excessive teacher work load, I would encourage you to do so. If your are less lucky, then why not give timely practice a try?

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<sup>3</sup> We call each small bite of learning a layer. Go to [www.timelypractice.com](http://www.timelypractice.com) and click the resources button. On the learning resources page you can click the name of any topic and find topic sample for the teacher which shows examples of questions for each layer and practise-learn worksheets for each layer. These are under a creative commons licence - so feel free to use these. The majority of our practice questions, are reserved for retrieval practice, and are only available through using the timely practice app.