



**Chris Payne** reviews the research, and reflects on testing as a tool for learning.

**M**ost teachers at some stage of their careers give their students written tests, either paper-based or, if the technology is available, computer-based. The kind of test used can range from the teachers' own informal tests, such as a vocabulary test, school end-of-term or end-of-year exam, to mock tests of official examinations, like those offered by Cambridge Assessment English. Naturally, we urge our learners to prepare for these tests by revising or studying as much as possible.

**!** Which of the following study patterns do you think is more likely to lead to better results in a final test?

- 1 Study – study study study – Final test
- 2 Study – study study test – Final test
- 3 Study – study test test – Final test
- 4 Study – test test test – Final test

Intuitively, many of us will choose pattern number 1, so you might be surprised to hear that, according to research, the most effective pattern is number 4, in which one study session is followed by three testing sessions. In fact, pattern 4 can improve retention by about 80 percent, compared to pattern 1.

## Learning and tests

Does this mean that our learners should be doing more tests?

The value of testing has long been debated, and it is not uncommon for teachers to want fewer tests and to complain about having to 'teach to the test'. Certainly, the idea of increasing the number of tests that we give our students will not sit comfortably with all teachers, some of whom may feel that testing is not teaching, and that 'subjecting' our learners to more tests will take up valuable class time that would be better allocated to 'real' teaching.

But let's look at the research.

## Learning from tests

It is commonly assumed that learning takes place during a period of study, and that the role of tests is merely to assess learning that has already occurred. However, research carried out by Endel Tulving back in the 1960s and, more recently, by Jeffrey Karpicke and Henry Roediger suggests that we need to reconsider this view of tests. Karpicke and Roediger asked two groups of tessees to study a list of words, using different study patterns, and to take a delayed final test:

- The subjects in a 'repeated study' group similar to pattern 2 above studied the entire list 15 times, with only one test session before the final test one week later.
- The subjects in a 'repeated test' group like pattern 4 studied the list only five times, but with repeated test sessions before the final test.

Despite studying the list considerably less, the 'test' group convincingly outperformed the 'study' group in the delayed final test.

Karpicke and Roediger's research built on Tulving's pioneering work, and replicated his earlier findings that studying material once and being tested on it three times results in more durable retention than studying three times and being tested once.

Curiously, students don't need to be given corrective feedback on wrong answers for tests for their retention to benefit.

## Learning with tests

It would appear, therefore, that tests do not just serve the purpose of assessing what has been learnt; they also enhance and contribute to learning. This is known as the 'testing effect' and, in the light of these findings, perhaps our approach to using tests in the classroom should be reviewed. Traditionally, we give tests in order to assess the efficacy of our students'

learning and our teaching. The main implication of the testing effect is that teachers are advised to regard tests not only as a means of *assessment*, but also as a powerful *learning tool* which can aid the acquisition of knowledge.

## Retention

So why is frequent testing believed to be better for long-term retention than studying? Let's first consider studying.

Repeatedly studying and re-reading notes affords us a growing sense of familiarity with the material to be learnt. It also creates the 'illusion of knowing': the belief that we have comprehended and learnt what we have read, which can lead us to overestimate how much we know. But, alas, when we are tested on the material, we frequently remember less than we thought we would. Although revising or re-reading helps make material more familiar, learning gains are greater when students utilise learning techniques that are more cognitively demanding.

## Retrieval

Robert Bjork (quoted in Karpicke and Roediger) cited evidence that learning techniques which require more effort to recall information enable us to retain more in the long run, even though they make initial learning harder. He refers to them as 'desirable difficulties'.

*When the words in a text are blurred or written in a font that is hard to decipher, we recall the content better.*

The effort made to discern the content of this sentence is said to produce better retention. Tests are another 'desirable difficulty' and, unlike simply reading, the benefits of testing on retention are twofold:

- One is that they compel the students to retrieve information stored in the memory, and it is this effort to practise retrieval that strengthens long-term memory. This is because every time information is successfully recalled, it is then re-stored in the memory with new and different connections, which enhances retention.
- The other benefit is what is termed the 'hypercorrection effect', which occurs when you discover that an answer you were sure was right is, in fact, wrong. The more certain you were that your answer was right, the more likely you are to pay attention to and remember the correct answer than if you were more doubtful about your answer.

However, it needs to be stressed that, while more difficult techniques like tests can have a positive impact on our ability to recall information, they only qualify as desirable if they are attainable, so gauging the correct level of test material is paramount.

## Reassurance

The testing effect may be demonstrable, but our students will not necessarily buy into the idea of further testing without being given a credible explanation of its benefits – or the effect on their motivation and attitude to learning could be a negative one. It is, therefore, important to *explain* to them that the repeated retrieval and re-storing of information through testing

helps memory more than other kinds of study.

The research that we have discussed tested lists of *words*, but the evidence suggests that the testing effect can work equally well with *passages of text* and *grammar*, which are also prevalent alongside vocabulary in an ELT context. Nor should our testing be confined to formal tests taken under exam conditions. A broader definition of testing is recommended, which includes low-risk tests in the form of quizzes, reviews and self-tests, in which there are no consequences for failure.

## Regularity

To be most effective, tests need to be used regularly. David Didau reviews material by testing his learners in every lesson: '*What if every lesson began with a test of what the students had studied the previous lesson? Far from finding it dull, most students actually seem to enjoy this kind of exercise.*' This approach will certainly alert the students to what they actually know, and will expose the illusion of knowing!

If such frequent testing is not practicable in your teaching situation, a test on lesson material once a week or, at the least, once every two weeks is recommended. It is also a good idea to give the students the answers for them to mark their own tests, because, in consonance with the 'hypercorrection effect', the best person to *mark* a test is the person who *took* the test.

It is also vital that our students test *themselves* more, so we should encourage them to self-test repeatedly while they are studying, in order to tap into the testing effect.



Karpicke and Roediger demonstrated that testing can benefit the study of meaningful material in and out of the classroom, but research on testing goes back even further. As long ago as 1917, Arthur Gates undertook a study and consequently concluded that learners ought to devote 30–40 percent of their time to initial study and the remaining 60–70 percent to testing.

The claim that the repeated retrieval of information through doing more tests promotes better long-term learning is, then, supported by research, so whether or not it will be embraced by teachers and learners needs itself to be put to the test! ■

Didau, D *What If Everything You Knew About Education Was Wrong?* Crown House Publishing 2015

Karpicke, J D and Roediger, H L 'Repeated retrieval during learning is the key to long-term retention' *Journal of Memory and Language* 57 2007

Gates, A I 'Recitation as a factor in memorizing' *Archives of Psychology* 6 (40) *The Science Press* 1917

Tulving, E 'The effects of presentation and recall of material in free recall learning' *Journal of Verbal Learning and Verbal Behavior* 6 1967



**Chris Payne** is the owner of Paddington School of English, Linares, Spain. He is an experienced teacher and a former Cambridge English oral examiner and oral examiner trainer. He has written numerous published articles on ELT.  
paddingtonschool@outlook.com