Does it work for more able learners too?

1. Recall and retrieval practice

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Introduction

Schools are increasingly looking to the research evidence to understand how they can improve the learning and achievement of their students. Educational researchers such as John Hattie, Daniel Willingham, Barak Rosenshine and John Sweller have begun to influence the practice of many schools, while many are also undertaking their own school-based enquiries and research. Organisations such as the Chartered College, EEF and Ofsted are endorsing and disseminating evidence-based practices, with the result that it is not unusual to see in schools the use of Rosenshine's Principles to inform lesson planning, or cognitive load and recall theory informing curriculum planning and classroom pedagogy.

We know these practices are having a positive effect on many learners. However, it is important that we also interrogate these pervasive approaches – and their theoretical underpinnings – to evaluate what impact they have on different groups of learners, including the most able. In this series of information sheets, NACE sets out to do just that. This is part of our ongoing review of evidence-based approaches to teaching and learning, alongside a specific focus on research and developments directly affecting more able learners.

We start the series considering the issue of **knowledge recall and retrieval practice**, presenting a digest of current thinking with key sources referenced and suggested further reading. Subsequent publications will look at cognitive load theory, metacognition and pedagogical frameworks such as the Fisher-Frey model and Rosenshine's Principles of Instruction.

Many schools are actively using recall and retrieval practice, and evidence from NACE member schools suggests this is having a strong influence on teaching and learning policies and classroom practice at both primary and secondary phases. In this review we consider the main tenets of recall and retrieval and how it is being applied to teaching generally, and then look at the extent to which the theoretical framework can be applied to learners who show high ability and what that might look like in classroom planning and practice.

The context: what is recall and retrieval practice?

Retrieval practice is a strategy in which bringing information to mind enhances and boosts learning. A 2006 study by Roediger and Karpicke has become a classic in this area. McDaniel et al. (2011) also demonstrated the effective use of retrieval practice in middle school science classrooms. Cognitive scientists used to refer to retrieval practice as "the testing effect". The act of pulling information "out" from our minds dramatically improves learning, not the tests themselves.

- Deliberately recalling information forces us to pull our knowledge "out" and examine what we know.
- The "struggle" or challenge to recall information improves our memory and learning – by trying to recall information, we exercise or strengthen our memory, and we can also identify gaps in our learning.
- *Retrieval* is the active process we engage in to boost learning; tests and quizzes are merely methods to promote retrieval.
- Retrieval practice makes learning effortful and challenging. The more difficult the retrieval practice, the better it is for long-term learning.
- Struggling to learn – through the act of practising what you know and recalling information – is much more effective than re-reading, taking notes, or listening to lectures.
- Slower, effortful retrieval leads to long-term learning. In contrast, fast, easy strategies only lead to short-term learning.
- Having to actively recall and write down an answer to a flashcard improves learning more than thinking that you know the answer and flipping the card over prematurely.

Source: **https://www.retrievalpractice.org/why-it-works**

- Retrieval practice is such an effective revision technique because it requires students to recall previously learnt knowledge, which creates stronger memory traces and increases the likelihood that the information will be transferred to the long-term memory.
- The process of retrieving information from memory actually helps it to be consolidated: a test can make the memory more secure and less likely to be forgotten.

Source: **https://blog.innerdrive.co.uk/why-you-need-to-know-about-retrieval-practice**

It is easy to measure the effect of retrieval practice with simple facts or word lists, and the extent to which the benefit extends to complex materials has been questioned (e.g. van Gog and Sweller, 2015; see also Karpicke and Aue, 2015). However, the effect has been shown many times with the learning of texts, and Butler (2010) found that questions on a passage also improved learners' ability to transfer ideas to other contexts, suggesting that retrieval can help to support a broader understanding.

Karpicke and colleagues (2014) tested ways of scaffolding retrieval using partially completed concept maps – diagrams that help to represent relationships among ideas about a given topic. Students were first allowed to fill out the concept maps with the text in front of them. Then the researchers took away the texts, and had the students complete these partially completed concept maps by recalling the information from memory. Using this scaffolded retrieval activity, the children were much more successful on a learning assessment later.

Source: **https://impact.chartered.college/article/firth-assessment-as-learning-role-of-retrieval-practice-in-classroom/**

In practice: what's working?

Current research seems to suggest that most teachers and learners in most learning situations would benefit from increasing the level of retrieval used, i.e. the amount that learners have to actively recall from memory, and that this should be preferred to re-reading or re-teaching as a learning strategy.

Research initially found that tests or short quizzes dramatically improve learning. Further research has shown that additional recall methods are equally important for improving learning:

- Direct verbal questioning
- Self-questioning
- Writing notes from memory
- Using flash cards
- Writing essays
- Group discussion.

The key factor is that information is actively retrieved rather than passively heard or re-read – a principle that can be applied to any subject discipline. A straightforward method for a teacher who uses PowerPoint would be to insert slides with short questions, either at the end or throughout (see Weinstein et al., 2016, for a discussion of the relative efficacy of interspersing question slides as opposed to testing at the end).

It seems that in order for retrieval practice to work well with students of any age we need to ensure that students are successful in the recall activity. Scaffolding is a great way to help increase retrieval success. Scaffolding could be implemented with any student, but it may be particularly important with students who may struggle to recall on their own from the start e.g. the use of partially completed concept maps for pupils to complete by recalling previous learning; the use of question maps (similar to a mind map but with a question or prompt for each strand), to be completed by recalling information previously studied.

Source: https://impact.chartered.college/article/firth-assessment-as-learning-role-of-retrieval-practice-in-classroom/

What does this mean for more able learners?

Retrieval practice works well for students of many ages and abilities, but for some students writing out everything they know on a blank sheet of paper may be a daunting task that does not lead to much successful retrieval.

To increase success, teachers can implement scaffolded retrieval tasks, like the mapping activities described above. With scaffolding, the students can successfully produce the information and work their way up to recalling the information on their own.

Examples of other related activities include "retrieval roulette": randomly select questions from a full set contained in a spreadsheet and display the questions on the board. The quiz has five questions from any point in the course so far and then five questions from the current topic. Give students ten minutes to answer in the back of their books and they then peer-assess. This is followed by a discussion to clarify misconceptions etc. As well as encouraging retrieval practice, the combination of current and previous topics means that areas of study are spaced and interleaved.

Source: **https://impact.chartered.college/article/firth-assessment-as-learning-role-of-retrieval-practice-in-classroom/**

Importantly, in order for retrieval practice to be effective, pupils' recall needs to involve "struggle" and challenge.

Other ideas which could be used when working with more able learners:

- **Think-pair-share:** With single-answer or open-ended questions, e.g. "Think of something you learned yesterday about…"
- **Low-stakes quizzes:** On paper, digitally, or using a game.
- **Brain dump:** Individually and collaboratively.
- **Flashcards:**
  Once a card has been mastered, keep it in the deck a while. Research has shown that students tend to "drop" cards out of their decks too soon after they have mastered them (Karpicke, 2009). Ideally, a fact should be successfully retrieved three times before a student moves on from it.

  Actually retrieve: Karpicke's research also found that when students see a familiar prompt on a flashcard, they have a tendency to tell themselves they know it, then flip it over to see the answer, rather than taking a few extra seconds to actually recall the answer – and ideally, say it out loud – before flipping the card over. The difference in timing is subtle, but important: students will not get the same benefits from flashcards unless they *actually retrieve* the answer before seeing it.

  Shuffle the deck: Keeping the cards in the same order makes them predictable. Once a deck has been gone through a few times, it should be shuffled to make it more challenging.

Source: **https://www.cultofpedagogy.com/retrieval-practice/**

More able learners are likely to be able to move on quite quickly to less scaffolded forms of retrieval practice such as recalling all they know about a specific concept/subject on a blank piece of paper.

References and further reading

- https://www.retrievalpractice.org/why-it-works

- https://blog.innerdrive.co.uk/why-you-need-to-know-about-retrieval-practice

- https://impact.chartered.college/article/firth-assessment-as-learning-role-of-retrieval-practice-in-classroom/

- https://www.cultofpedagogy.com/retrieval-practice/

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