

Retrieval Practice

(Dr. Birgit Hawelka in conversation with PD Dr. Magdalena Abel)

Birgit Hawelka:

Hello, and welcome to today's podcast. My name is Birgit Hawelka, and our guest today is Magdalena Abel, a senior lecturer at the Institute of Psychology at the University of Regensburg. According to retrievalpractice.org, she's one of 35 cognitive psychologists you should have heard of. So we're really pleased to be able to find out more about her and her work today. Welcome, Magdalena! It's great to have you here.

Magdalena Abel:

Hello from me too. Thanks for inviting me. I'm happy to be here today.

Birgit Hawelka:

One of the topics you're concerned with as a cognitive psychologist is "retrieval practice". What does that actually mean?

Magdalena Abel:

"Retrieval practice" is a specialist term from the cognitive psychology. The German word for "retrieval" is "Abruf". What this essentially means is the process of remembering, so it's about getting information from your memory, reactivating it, reproducing it. That's what we mean by "retrieval".

And the word "practice" just means that you practise it. So what we understand by "retrieval practice" is that you practise retrieving information. Essentially, you use the process of retrieving information so that you can keep the content fixed in your memory and stabilised there so that you can remember it really well for a long time as well.

Birgit Hawelka:

It sounds a bit like it's about repeating content over and over again. So what's the difference between retrieval practice and the usual repetitions we're all familiar with when we have to learn some definition or other off by heart, for example?

Magdalena Abel:

You can also use retrieval practice as a form of repetition, of course. In that context, you would use memory tests, for example – so that's the process where you review your own memory again and again, actively accessing the contents repeatedly in order to repeat the information so as to anchor it in your memory better. The most important thing here is that it really is a very active method. So when I use this method, it really challenges me. It's more challenging than rereading or revising something passively, for example.

And with this active method, the important part is practising how information gets back out of my memory. So it isn't just how I get the information *into* my memory but also how I can practise retrieving it again successfully – how I can get it back *out* of my memory again. In comparison, if you look at passive repetition formats – things like rereading vocabulary pairs or revising things off by heart, where you simply keep muttering that content to yourself over and over again without retrieving it from your memory –, it's only a question of how I get information into my memory. And then I don't have the effect of practising retrieval as well at the same time, practising how to get the information from my memory.

Birgit Hawelka:

So it seems to have cognitive advantages to practise that actively in the form of quizzes, for example. You did an interesting research project on that topic, didn't you, where you looked a bit beyond the limits of cognitive psychology alone? What exactly did you investigate?

Magdalena Abel:

In the research project we conducted we built on research into the "testing effect". Basically, that's the cognitive advantages you just mentioned. That in principle, if you integrate retrieval practice into learning, so you already integrate the tests while you're learning, the advantages for memory performance are significantly greater, particularly long-term, than if you just practise the information by rereading it or repeating it again.

What we've done is to ask whether retrieval practice like this, whether actively practising information can also have positive effects on not only the memory but also other components associated with self-regulated learning – very specifically on people's intrinsic motivation – that after learning people are basically still motivated to invest time voluntarily in new learning. We tried to take a look at that. And the reason why we thought retrieval practice could be particularly helpful here is, for one thing, that retrieval practice is more challenging, so it's not too easy, but not too hard. It could be an ideal challenge, at least if you have the optimum degree of difficulty, and challenge the person a bit more than passive learning alone would do.

And for another, retrieval practice can also represent a kind of structure so that you can get positive feedback on your own learning performance. If I imagine that I keep on doing memory tests for certain content, to start with I think, "Oops, I can't do that at all yet". So, I'm still sort of failing to remember the information, but then I'm given feedback. The next time I try it, I think,

“Oh, now I’m getting closer to how I imagine I’d like to remember that”. And then at some point, I can do it. Basically, that means that retrieval practice can make this learning process more transparent and the learning progress more tangible to the learner. And those two reasons – the optimum difficulty of retrieval practice and this transparency of the learning process in itself – are very good ones that could lead to you also being intrinsically more motivated to keep at it and invest time in further learning.

Birgit Hawelka:

And how exactly was your study structured? How did you investigate it?

Magdalena Abel:

We carried out a laboratory study at the University of Regensburg. That means, we invited participants into the lab and asked them to remember vocabulary pairs. These vocabulary pairs were in German and Swedish. One group of participants did this very passively. They simply saw the vocabulary pairs over and over again and were supposed to try and memorise them as well as they could. Another group of participants were subjected to active retrieval practice and were repeatedly given tests of the vocabulary pairs connected to subsequent feedback. We then tested their memory and did in fact find positive effects.

But that wasn’t really our main focus actually, because the point of our study that was of most interest was that after the memory test we left the participants on their own in the lab for a certain time on some pretext and said to them, “Well, the experiment’s finished for now, but you’ll have to wait for a little while. I’ll be back in five minutes. I just have to discuss something with my supervisor for a minute”. And then the participants were in the lab on their own. They were allowed to do whatever they wanted. We provided them with learning materials on the computer. That is, we told them, “If you want, you can also listen to how you would actually pronounce those words in Swedish. We’ve got a native speaker who recorded those audio files”. We also provided more information on the country of Sweden and said that the participants were welcome to keep themselves occupied with that if they wanted. Or that we also had loads of newspapers and magazines in the lab and offered those too: “If you don’t feel like doing that, you can just take a look through those a bit as well”. Meanwhile, of course, everyone nowadays has their own smartphone in their trouser pocket and can do various things with that too that no longer have anything to do with learning.

What we actually did during those five minutes, however, was to measure whether the participants were further motivated to invest time in learning about this Swedish content and also how much time they invested. And what we found was that the participants who’d had the active practice template – with the memory tests and retrieval practice – were significantly more ready to invest time, that is, they stayed with it more and did that voluntarily without there being any kind of extrinsic motivators for looking at further content or occupying themselves with it further.

Birgit Hawelka:

That voluntary occupation, as you said, is actually exactly what should be the goal outside the lectures and seminars, of course. That means that students still take a deeper look at the subjects voluntarily even after a lecture or seminar has ended. So how could retrieval practice be integrated into teaching outside these lab scenarios? Do you have any ideas or could you make one or two specific suggestions in that regard?

Magdalena Abel:

There are really wonderful opportunities for doing that, of course – when we're doing in-person teaching for a start. It doesn't matter whether we're talking about lectures or seminars.

I can take an organisational approach here, of course, and also use part of my teaching time to integrate these kinds of tests actively. It doesn't have to be much – it can be five minutes now and then. If you have a bit more time available, you could perhaps even do it for 15 minutes.

And what you can do exactly – it can be very low level. You could ask questions that pick up the important ideas from the lecture or seminar again, for example, share it with the whole course in a PowerPoint presentation or encourage individual people to try and answer them. That's the low-level option, as I said.

But now there are also really, really good technical options that you can use very easily to integrate retrieval practice into the lecture or seminar. That starts with those kinds of clicker systems but there are now really good apps around too. Things like Kahoot, for instance. You can use that to make quizzes available for an entire course. The people can register with a QR code and then work on the quizzes on their smartphones, for example. And the nice thing about that is that you can also see which answers the course participants prefer directly in real time and how often the correct answers are chosen or not. And then you can discuss it with the people in a plenary session again as well, of course.

Furthermore, it should also be emphasised, of course, that you also have a great degree of freedom when you integrate retrieval practice of this kind. You can do it at the end of the lecture or seminar, of course, so as to pick up the most important concepts you've just discussed again and test them. But you can also do it in-between every now and then so as to separate certain phases of a course where the content concerns different themes, for example. Or I can do it right at the start as well, either to see what the people already know about the content I'm just about to cover with them or to reactivate the content from the last class again as well and to sort of address it again using a little test or quiz.

Birgit Hawelka:

So from a technical standpoint, finding a solution is presumably no problem at all. You indicated that there are various options, whether it's using apps, learning management systems or other options.

What seems to be a bit of a sticking point to me is the degree of difficulty you mentioned, that optimum degree of difficulty. That's always a bit of a problem, finding the medium degree of difficulty for the average person. Research on the topic of MOOCs, for example, has revealed that if there initial assessments are done – things like feed forward or aptitude tests, whatever you want to call them –, the drop-out rate is already very high from the get-go if there are too many questions that the people can't answer in that case. So a bit of experience would seem to be necessary. How do I manage the degree of difficulty?

Magdalena Abel:

Well, that's definitely a challenge, of course. You also have to consider that fact when you're introducing those kinds of questions into teaching at university. That's as clear as day.

Perhaps one point before I start: research has actually been done into what it does to the memory, particularly when tests are sent beforehand that you perhaps can't answer correctly at all because you haven't even had the information yet. And funnily enough, even if you've tried to answer questions like that although it wasn't even possible for you to manage to get it right, even then you still have an advantage when it comes to remembering it later. It may be because if you can memorise the material better the first time you do it, that's precisely the information you can concentrate on better. There are various suggestions as to why that should be the case. But that has actually been proven. That means that even if I present questions at the beginning of my course that the people can't manage to answer well at all, that isn't necessarily a bad thing, because if during my course I manage to give the people the opportunity to be able to come up with the answer at the end of it, for example, that can turn into a positive experience as well. I just wanted to say that before I go on.

But the question was actually a completely different one, namely, "How do I find out what the optimum degree of difficulty is?" As I said, that's not all that easy. You particularly have to assume that it's not a homogeneous mass of people sitting in front of you in your course but people who have different levels of proficiency. People who already have a bit of prior knowledge, and people who perhaps have no prior knowledge at all or only very little. That means that it's probably a very good idea to vary the degree of difficulty. That means spreading it out a bit – not just including really difficult questions but some where the level is maybe a bit lower, and some that are more at the medium level. And then you could also include a couple of questions that get right down to the brass tacks so that you can also show the variability of this field that you're trying to test by posing those questions.

Birgit Hawelka:

The solution regarding the different levels of difficulty is a very good one, I think, so that you can try to kind of get everyone on board. Those clicker systems and apps in particular have become really popular recently anyway, although for a different reason really – so that things like formative assessments can also be integrated into the course so that the lecturers also have a

certain kind of feedback: what knowledge do the students actually have? And what requires even more focus perhaps?

So would you recommend just doing more quizzes? Or how should the teaching be designed so that the potential of retrieval practice can be ideally used?

Magdalena Abel:

Well, for a start I'd be happy for lecturers to just consider whether retrieval practice might not be helpful in the context of their lectures or seminars. You could, of course, come from an egoistic standpoint first of all and realise that you would be getting feedback yourself, as you just said. That the lecturers would find out for now where their students might have gaps they should fill. But it's also important to have on your radar that that definitely has advantages for the students themselves and that these advantages aren't restricted to their memory but, as our study shows, can also spread over to their motivation. There is other research that's been done that shows that retrieval practice can keep you paying attention. If I use that during a course to make a distinction between different sections, for example, it's easier for the people to stay on the ball and keep up with the learning content. So there's been research conducted into that as well. There really are lots of different positive effects. And in that regard, what I would wish first of all would be for lecturers to bear that in mind and just think, "At what point would that be helpful to me? And where might it be too much as well?" I don't have to use it left, right and centre either, of course, I can just use it a bit more sparingly but then in a way that is targeted.

And what really has to be said is that there has indeed been research carried out in applied contexts, particularly with regard to memory performance in the context of teaching at university. And the positive effects of retrieval practice really have been strongly verified by that research. So there really is very strong evidence from practice, from the field, that suggests that it's a good idea to do it. But what has not been done in applied research so far is to answer the question of what actually happens if you apply this kind of retrieval practice across the board. Where it's not only used in a lecture or seminar once a week, for example, but a student has five or six courses a day and retrieval practice is integrated successively into every single course. So far, it's not clear whether the effectiveness of this amount of retrieval practice would be lost at some point or whether it would be maintained. That means I wouldn't now advise anyone to do retrieval practice left, right and centre, in every lecture or seminar and at every opportunity simply based on a gut feeling. That's not what I'm calling for here. What I am calling for is really to use it in a targeted fashion where you think you will be doing the students a favour by doing so and where you can help their learning process.

Birgit Hawelka:

Thanks very much for the many interesting insights into this research field, Magdalena. I think we've also been able pick up a lot today about how it can be implemented in practice, and we'll

definitely continue to keep track of the progress of the research into the topic of retrieval practice for teaching at university. Thank you.

Magdalena Abel:

Thank you very much for inviting me. It's been a pleasure to be here.