

## OU Effective Learning Strategies - Feedback Barend & Stefan

### Keynote sessie 1: Shana Carpenter – Using prequestions to enhance student learning

Shana Carpenter works as an Associate Professor at Iowa State University. She showed that much research has shown that practice to retrieve information enhances learning. In nearly all of the studies on *retrieval practice*, students retrieve information after they have been introduced to it via a lecture or reading assignment. Very little is known about the effects of asking students questions *before* they learn something. In a series of laboratory- and classroom-based studies, students were given “prequestions” over information they were about to learn, and their learning of the material was later assessed. Results show that there are pros and cons to asking prequestions: it has a significant positive effect on the topics that the questions were about, but retention was lower in the control group for non-prequestioned topics in the reading materials. The effect, however, is different for watching videos. This could be caused by the fact that people have different reading strategies, such as scanning. These findings suggest that retrieval and pre-retrieval practices has the power to significantly improve learning retention, but are dependent on the type of information that is offered. One final tip is that if you have limited time, for instance like we as UB do with one-shot workshops, it is best to ask retrieval questions as soon after the workshop as possible.

### [Parallel session 1: Sanne Rovers - Self-regulation in PBL: How do students prepare?](#)

Sanne Rovers works as a PhD student at Maastricht University. Students in a PBL-curriculum use a wide variety of learning strategies. The study conducted by Sanne Rovers aimed at identifying the most used learning strategies by effective students within a PBL curriculum (at Maastricht University). Sanne first showed us an inventory of learning strategies and their extent and conditions of effectiveness (see picture below, Dunlosky, 2013).

Table 1 Effectiveness of Techniques Reviewed	
Technique	Extent and Conditions of Effectiveness
Practice testing	Very effective under a wide array of situations
Distributed practice	Very effective under a wide array of situations
Interleaved practice	Promising for math and concept learning, but needs more research
Elaborative interrogation	Promising, but needs more research
Self-explanation	Promising, but needs more research
Rereading	Distributed rereading can be helpful, but time could be better spent using another strategy
Highlighting and underlining	Not particularly helpful, but can be used as a first step toward further study
Summarization	Helpful only with training on how to summarize
Keyword mnemonic	Somewhat helpful for learning languages, but benefits are short-lived
Imagery for text	Benefits limited to imagery-friendly text, and needs more research

This framework was used for further investigation of learning strategies within the PBL context. Results show that effective students do not necessarily use more effective study techniques, but find a way to optimize often used techniques - such as summarizing - and combine these strategies with other techniques. They actively use these techniques and integrate, connect and/or cluster information, whilst self-monitoring and testing progress. They have a high level of adaptability and flexibility. Furthermore, they retrieve the information often, which improves their retention of information. So in sum, it doesn't really matter which techniques you use, as long as

you use it wisely and effectively switch among other techniques. This is important to know for our teachers when talking about the best learning strategies. Some final tips are:

## Tips for Using Effective Learning Strategies

Based on our review of the literature, here are a handful of suggestions for teachers to help students take advantage of more-effective strategies:

- Give a low-stakes quiz at the beginning of each class and focus on the most important material. Consider calling it a “review” to make it less intimidating.
- Give a cumulative examination, which should encourage students to restudy the most important material in a distributed fashion.
- Encourage students to develop a “study planner,” so they can distribute their study throughout a class and rely less on cramming.
- Encourage students to use practice retrieval when studying instead of passively rereading their books and notes.
- Encourage students to elaborate on what they are reading, such as by asking “why” questions.
- Mix it up in math class: when assigning practice problems, be sure to mix problems from earlier units with new ones, so that students can practice identifying problems and their solutions.
- Tell students that highlighting is fine but only the beginning of the learning journey.

### [Parallel session 2: Marloes Broeren – You can learn self-regulated learning!](#)

Marloes Broeren works as a teacher at Avans Hogeschool and conducts research on self-regulated learning in a course about communication skills. First, she explained the components of self-regulated learning: 1) use of effective learning strategies, 2) motivation, 3) metacognitive skills and 4) context. It is possible to learn self-regulated learning by effective instructions of retrieval practice.

The study she described in the session focused on the effect of instructional videos (posted in the online learning environment) on formative and summative assessment. The results showed that students who watched the instructional videos 1) conducted more formative tests, and results are translated from laboratory to classroom experience 2) had better retrieval scores at these formative tests in the 3<sup>rd</sup> session, 3) had no better scores as the exam at the end of the period. We can conclude from this session that instructional videos regarding self-regulated learning improved formative testing. However, it showed no effect on summative assessment. Thus, it seems valuable to guide students in self-regulated learning to instruct them explicitly about self-regulated learning. As UB, we could potentially translate these results in developing instructional videos about self-regulated learning.

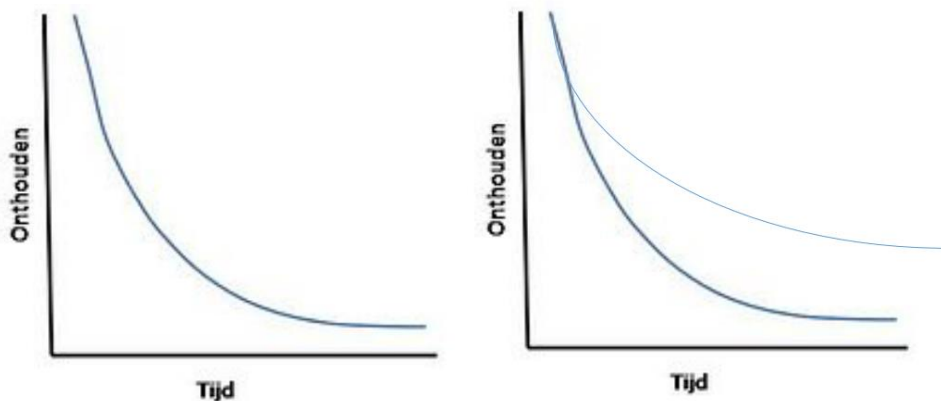
### [Parallel session 3: Kim Dirkx – Effective learning through formative testing](#)

Formative tests can contribute significantly to effective learning for students. However, a lot of teachers and students do not know how to use this method the right way. How many times do you need to test formative? In which way or form? And how many time should be in between sessions?

The sessions first looked into 10 advantages of tests, which are as follows:

- 1) Testing-effect
- 2) Identifying gaps in knowledge
- 3) Learning more from next phase
- 4) Better organization of knowledge
- 5) Better transfer of knowledge
- 6) Facilitating retention of non-tested information
- 7) Enhancing metacognitive monitoring
- 8) Preventing inferences from existing knowledge
- 9) Offering feedback to instructors
- 10) Stimulating study behaviors

The next part of the sessions was only about advantage 1: testing-effect. Results show that memory tests as opposed to only studying and then restudying information improves long-term retention of knowledge significantly. When shown in the forget-curve of Ebbinghaus (1885), it look like below:



From the research that the speaker did, she derived a list of short tips about formative memory tests, which can be very useful for us as UB when thinking about improving retention of information. The tips are as follows:

- Allot of students choose to only test themselves by retrieving information just before exams. However, research shows that spreading learning moments (and thus spreading test-moments) has more effect. The best moment to do a formative test, is somewhere between 1 to 6 days before the summative exam. In doing so, it is also important for students to re-read the materials after the formative test.
- The testing-effect is most robust for learning word-pairs and facts derived from texts. When it comes to solving cases, the literature is incossisive.
- Research shows that offering more than two formative tests doesn't have a significant larger effect than just one formative test. However, this is mostly the case when there is not much time. In the regular education, it is advisable to do more tests regularly.
- There is some research that suggests that when students can choose when they do their formative test versus when the teacher decides the time of the test, this impacts their results positively.

#### [Parallel session 4: Felicitas Biber and Anique de Bruin – Study smart](#)

Felicitas Biber works as a PhD student at Maastricht University and conducts research on teaching study skills to students. She works in collaboration with Anique de Bruin, who is an associate professor at Maastricht University.

This workshop focused on the 10 learning strategies (see Table 1). In Problem Based Learning (PBL) an important step is self-directed study. However, this step is often regarded as a blind-spot as we have limited insight in the self-studying behavior of students. So, the presenters developed

a Study Smart Training, which consists of three parts: 1) Awareness, 2) Reflection, 3) Practice. The training implements the results of research showing that distributing practice and self-testing are the most effective learning strategies, while summarizing, rereading and highlighting are amongst the least effective strategies of learning. In most faculties at Maastricht University, the training is embedded with the curriculum.

The first preliminary results showed that students shifted from rereading (a less effective learning strategy) to more distributed practice (a more effective learning strategy). It was also indicated that experienced learning differed from actual learning. This means that students subjectively have difficulties to perceive actual learning benefits from how they experience their learning. A next step would be to test the beneficial effects in objective measures. An important take-away message for the UB is that we should focus more on distributed practice and self-testing. For example, providing awareness about these strategies in learning information literacy would be highly valuable for UM students.

### [Keynote session 2: Tim Surma – The role of teachers in effective learning](#)

The final keynote addressed a very important topic: the role of teachers when it comes to facilitating effective learning strategies. The speaker really tried to translate theory to practice in a fun and engaging way. In doing so, he addressed three of the most promising learning strategies that we as teachers can influence:

- 1) **Distributed practice:** Distributed practice (also known as spaced repetition or spaced practice) is a learning strategy, where practice is broken up into a number of short sessions – over a longer period of time. This is opposed by massed practice, which involves studying the materials in mass. The spacing effect that results from this distributed practice, significantly improves long-term memory retention. There are a few tips to do this as a teacher:
  - a. *Start your lessons with a short recap;*
  - b. *Spread basic knowledge/skills over time;*
  - c. *Shuffle with tasks and exams;*
- 2) **Retrieval practice:** Retrieval practice is a learning strategy where we focus on getting information out. Through the act of retrieval, or calling information to mind, our memory for that information is strengthened and forgetting is less likely to occur. The retrieval practice is opposed by the regular rereading of materials. Results show that when facilitating retrieval practice, in the form of formative tests, there is a testing-effect: the act of doing the test (retrieving information) has a positive effect on the long-term memory retention. There are a few tips to do this as a teacher:
  - a. *Ask a lot of questions;*
  - b. *Facilitate free recall;*
  - c. *Find ways to involve everyone;*
  - d. *Actively recover knowledge;*
- 3) **Interleaved practice:** Interleaving is a process where students mix, or interleave, multiple subjects or topics while they study in order to improve their learning. Blocked practice, on the other hand, involves studying one topic very thoroughly before moving to another topic. As a teacher you can facilitate this by shuffling topics within your course content. Results show that on the short-term memory retention, interleaved practice has a lower result, but the long-term memory retention is almost double. There are a few tips to do this as a teacher:
  - a. *Avoid blocked practice;*
  - b. *Create diagnose tests;*
  - c. *Shuffle equal questions types with unequal ones;*
  - d. *Have students use a Cornell-scheme.*

The above learning strategies can be implemented in our own UB-curriculum. Especially when thinking of practice assignments.