USING THE FINDINGS OF COGNITIVE PSYCHOLOGY IN ACADEMIC PHILOSOPHICAL LEARNING CONTEXTS: SOME EXAMPLES

Patrick Maisenhölder

Pädagogische Hochschule Ludwigsburg

Universität Stuttgart

patrick.maisenhoelder@ph-ludwigsburg.de

Abstract

In this text, the findings of cognitive psychology will be used to tackle certain misconceptions in academic philosophical learning contexts. It will be shown that some techniques that university teachers often recommend and on which students often rely on for working on texts and acquiring the contents of them and other contents – like for example highlighting, note-taking, and summarization – are not that effective for long-term retention. At least not if some aspects are not considered. The aim is to show what empirical research has found out about effective learning and how this can help to create tasks that foster long-term retention of philosophical contents which also helps with training higher-order skills such as applying, reflecting, evaluating, and modifying these contents.

1. On the use and abuse of common techniques for learning

In academic contexts and therefore also in academic philosophical contexts,[1] certain conceptions about effective learning are well-established. Especially about the effective learning from texts that students have to read in seminars. "[S]urveys of college students confirm what professors have long known: highlighting, underlining, and sustained poring over notes and texts are the most-used study strategies, by far" (Brown/Roediger/McDaniel 2014: 15). Also, techniques like summarizing texts can be added to these common strategies. (Dunlosky et al. 2013). But the problem is that these common techniques who are thought of to be effective for working on texts and acquiring the contents of them and other learning contents are not that effective (Dunlosky et al. 2013). At least, if they are not done in a certain manner. The consequence of using wrong strategies, or, for that matter, using them wrongly, is that students invest too much time considering how little of the learning contents[2] they are able to

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[1] There are no studies known to me that focus on academic philosophical learning contexts alone. But from the research available and my own experience, it seems highly probable that the problematic misconceptions described here do not stop at the frontier of academic philosophy but can also be found within it.

[2] In this text, philosophical learning contents are everything teachers in academic philosophical learning contexts want their students in their courses to be able to retrieve from the mind when they are asked for it. This can be, the overall gist of a text, ideas, terms, models, theories, definitions etc. This does not mean that in every case they

retrieve in the long run.

This is not only a problem because of the waste of time for the students (as well as the teacher who has to use time in the course to repeat what students ought to know) but also because a better retention of learning contents (in Bloom's 1956 or Anderson's 2001 language: *remembering* and *understanding*) helps students with the ability to apply the learning contents "more flexibly in the future, applying what they know in new situations" (Weinstein/Sumeracki 2019: 120). Furthermore, better retention supports the abilities to reflect, evaluate and modify ideas, terms, models, theories, definitions etc. (Agarwal/Bain 2019: 42-43). In other words: Research has shown that better retention of learning contents supports higher-order skills.

Considering philosophical problems (cf. Barz 2019), retrievable knowledge and higher-order skills are important. In the process of tackling a philosophical problem, it is helpful to know and to be able to apply existing solutions or parts of solutions to the problem, i.e. ideas, terms, models, theories, definitions etc. But, of course, these problems cannot be solved by just using existing ideas, terms, models, theories, definitions etc. since their contribution to the solution of the problems is not given by themselves and often up to debate. They cannot simply be applied to a problem to solve it in the way physical knowledge can be applied to create solid bridges. Therefore, students in philosophical learning contexts also need to be able to reflect, evaluate and modify the solutions before applying them to a problem – or have to discard them before this can happen if the solutions do not have the required quality (Brosow 2020).[3] In order to have applicable solutions at hand and to train higher-order skills, learning contents have to be retrievable from the mind. A good retention of learning contents is therefore necessary in academic philosophical learning contexts – at least for a certain quality of philosophizing as the process of trying to solve philosophical problems (Roeger 2016: 95-96). However, the strategies to foster the retention of philosophical learning contents differ in their effectiveness.

The question now is: what do teachers in academic philosophical learning contexts have to consider when they want their students to effectively read texts and acquire the contents of them and other learning contents better?[4] To answer this, a distinction between so-called retrieval

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should be able to reproduce them word-for-word (although some technical terms often have to be remembered correctly). It also means that they have to be able to reproduce them in their own words. Philosophical learning contents can therefore, of course, be everything that teachers in academic philosophical learning contexts want their students to know even if the things in questions have – from certain perspectives – nothing or only remotely to do with philosophy. But this text does not ask if the learning contents that teachers in academic philosophical learning contexts want their students to remember really *are* philosophical learning contents, and it does not ask what *ought* to be taught and learned. The text is about effective learning techniques for the contents that teachers choose for their courses – without evaluating them. But to give the reader some ideas of philosophical learning contents that at least the German-speaking philosophers think of not only being worth teaching and learning but also necessary in academic philosophical learning contexts, I recommend the study conducted by Frank Brosow and Andreas Luckner (2019) of which the main results are also available in English (Brosow/Maisenhölder 2019a) and texts presenting the results of this study (e.g. Brosow/Maisenhölder 2019b). The philosophers and texts presented there and the names, ideas, terms, models, theories, definitions etc. that can be found in the texts mentioned or in the philosophical approaches of the respective persons are philosophical learning contents that could be learned more effectively with the ideas presented in this text.

[3] If the new solution passes the quality test, it may nevertheless require further reflection. Even when the solution becomes a new learning content, e.g. if it is a well-reasoned solution of a philosopher, it is still up to debate because it may contain undetected problems, so that the reflection, evaluation and/or modification of it still is necessary.

[4] According to Jonas Pfister (2014: 117), the didactics of philosophy tries to find answers on ten different questions of which two are descriptive questions. These two questions ask how one can teach and learn (best) in

practice and other learning strategies has to be made.[5]

2. What retrieval practice is and why it works

While "[l]earning is usually thought to occur during episodes of studying, whereas retrieval of information on testing simply serves to assess what was learned" (Roediger/Butler 2011: 20), research has shown that retrieving information from memory is not only an assessment strategy but also an effective learning strategy.

As the name suggests, retrieval practice focusses on "pulling information out of students' heads, rather than cramming information into students' heads" (Agarwal/Bain 2019: 14). It is therefore realized by so-called closed-book tasks which means that learners complete tasks without viewing their notes, summaries, or texts while doing so. The effectiveness of retrieval practice, which is (partly) attributed to the so-called *testing effect*, has been shown in various experiments.

In one of the experiments that are often used as a reference for research on retrieval practice, Roediger and Karpicke (2006) let 120 students learn information about the sun and sea otters. One group of students had to read the texts twice – i.e. review the information – while the other group read the text only once and wrote everything down what they remembered from the one-time reading of the text – i.e. without reading the text again. Of each of these two groups, some students had to take a test on the material after five minutes, some after two days and some after one week. The results were – in brief – the following: "Relative to testing, additional studying aided performance on immediate retention tests; in contrast, prior testing improved performance on delayed tests" (Roediger/Karpicke 2006: 251). That means: while re-reading was accompanied with better short-term results, retrieval lead to better long-term results. These findings could be reproduced in several other studies.

The reason why closed-book tasks (as learning strategies, not as assessment strategies[6]) foster long-term retention of learning contexts has to do with what is known as *desirable difficulties* (Bjork 1994). The active retrieval of learning contents from the mind demands mental effort because active and conscious thought processes need to be activated. This increased mental effort leads to a deeper processing of the retrieved learning contents (Tibus 2008: 97). In other words: The central observation in research on desirable difficulties is that difficulties that stimulate elaborative processes during the learning phase often go hand in hand with improved knowledge acquisition (Merkt 2016: 104). Or to put it plainly: challenges are

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philosophical teaching and learning contexts. In this text, the findings of cognitive psychology are used to – at least partially – answer these questions.

[5] Hereby, I will mostly focus on Pooja Agarwal's and Patrice Bain's (2019) book *Powerful Teaching*. Although others – for example Brown, Roediger and McDaniel (2014) – have explained what retrieval practice is and how it works, the first two have not only described and explained it but also combined this with elaborated exercises that one can use in one's own seminars.

Conflict of Interest Statement: I may seem here and in the following a little bit enthusiastic about the book / website by Agarwal/Bain, but for me the resources they offer were just useful. Therefore, I want to declare that I have no personal connection to both the authors – neither financial nor personal.

[6] To be learning effective activities, exercises in which learners have to retrieve information have to be low-stakes or ideally no-stakes opportunities (Agarwal/Bain 2019: 48). That means that they are not graded or that the single grades students get are not weighty for the overall grade. The reason for this is that only then students can focus on their learning, do not have to worry about bad consequences but "can experiment, be challenged and improve over time" (Agarwal/Bain 2019: 48).

good for learning (Agarwal/Bain 2019: 241). Other tasks, like summarizing or highlighting texts, taking notes or reviewing the texts, summaries and notes, do not create such learning improving challenges.

That, of course, does not mean that every challenge makes learning effective. There are also *undesirable difficulties*. That means, tasks that are *too* challenging and therefore not learning efficient. They can then be quite the opposite since they can, on top, lead to demotivating experiences regarding the area of study which may lead students to turn away from the respective field. *When*, however, a desirable difficulty becomes undesirable is a question with much space for further research. Nevertheless, there are some findings. They will be discussed later in the text.

3. Strategies and Resources – some findings from learning psychology

How to create desirably difficult challenges? According to Pooja Agarwal and Patrice Bain (2019), one can make use of the so-called *power tools*. These are research-based strategies that work as criteria for designing learning effective exercises. Three of the four power tools they name – *retrieval practice*, *spacing*, and *interleaving* – are guidelines for creating desirable difficulties, and the last tool they mention is for fostering metacognitive skills and for preventing remembering false information: the *feedback-driven metacognition*.

Retrieval practice means "learning by bringing information to mind" (Agarwal/Bain 2019: 93) which leads to a deeper processing of learned information (see above). *Spacing* can be explained as retrieval practice that is done multiple times over a certain period of time. That means that the learning contents that are learned at time t1 are retrieved again at time t2, then at time t3 and so on. Here, the active retrieval creates a desirable difficulty that activates deeper processing, but also the time distance to the initial learning, which makes it harder to retrieve the respective information. So, this principle makes use of the finding that "forgetting can be a *good* thing – a desirable difficulty that powerfully increases student learning" (Agarwal/Bain 2019: 106). *Interleaving* means mixing similar learning contents (Agarwal/Bain 2019: 113). It leads to desirable difficulty because students have to actively discriminate between the contents, which leads to a deeper processing of information.

Here, of course, undesirable difficulties can occur. For example, when interleaving is done with beginners in a certain field of learning. Research has shown that inexperienced students profit most from "highly structured sequences of learning activities, where relative mastery of one small thing is acquired before moving on to the next bit of learning" (Concepción 2018: 29). In contrast: for near-experts and experts in one field of study, interleaving is the most learning efficient strategy since it creates a desirably difficult challenge for them to find fine nuances in similar concepts (Lang 2016: 74-76). When one wants to create desirable and avoid undesirable difficulties, such findings should be taken into account when designing learning scenarios.

The last power tool is a means against misunderstanding and remembering false information: *feedback-driven metacognition*. When the first three power tools are combined with it, the possibility that false information or misunderstandings are stored in the memory decreases, and initially falsely remembered information will be better remembered due to the *hypercorrection*

effect (Metcalfe/Finn 2012). It is a possibility to foster students' metacognitive skills". Students are "able to reflect on what they know and what they don't know" (Agarwal/Bain 2019: 123). At least, if tasks are designed in a certain manner. For example, if students do not only have to retrieve information but also rate how trustworthy they are. So, they may have to tick if they are sure or not sure to have the correct answer, which is then checked. They can see if they really knew what they claimed to have known. Such feedback is useful since "[r]esearch confirms that students frequently *think* they know something, when actually, they don't. Also, students are typically *overconfident* when they predict or assess their own learning" (Agarwal/Bain 2019: 126). So, exercises that make use of feedback-driven metacognition can help to learn how to assess one's learning and to fight the *illusion of fluency* and the *illusion of confidence* (Agarwal/Bain 2019: 127-131; Kahneman 2011: chapter 19-24).

To bring these power tools into good use, one can think about ways of implementing them into exercises. One may also use the different ideas that Agarwal and Bain present on their website where templates for different exercises that make use of the power tools can be downloaded.[7]

Retrieval practice can, for example, be implemented by simply switching from note-taking to retrieve-taking (Agarwal/Bain 2019: 63ff.). Students read texts or passages of a text but instead of taking notes with the text open, they read passages, close or cover the text and retrieve what they remember of the passage from their memory. Similarly, summaries can be modified by making them *free recalls* or *brain dumps.*[8] This means that students read texts or passages of texts but instead of highlighting the text, taking notes and afterwards summarizing it with the text and notes open, they do the same but close or cover their text and notes while summarizing the text. Thus, desirable difficulties are created, mental effort is increased, and processing is deepened. The same goes for mini-quizzes that students have to complete after reading a text – when the book is closed (Agarwal/Bain 2019: 65).

Spacing can be realized by using *Blast from the Past* (Agarwal/Bain 2019: 97-98) where students have to retrieve learning contents from their memory. One could also use *Power Tickets* (Agarwal/Bain 2019: 166-168) where the students have to answer questions to several topics.

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[7] https://www.powerfulteaching.org/resources. Accessed: 22nd September 2020.
[8] https://www.retrievalpractice.org/strategies/2017/free-recall. Accessed: 22nd September 2020.

What did we talk about…

	Today?	Yesterday?	Last week?	Last month?	Last quarter?	Last semester?
	[insert concept 1]	[insert concept 2]	[insert concept 3]	[insert concept 4]	[insert concept 5]	[insert concept 6]
Write **one** fact						
Write a **second** fact						
Write a **third** fact						

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Figure 1. Power Ticket Template.[9]

Depending on the topics, this exercise could also be used for interleaving. For example, if there were similar concepts covered throughout the semester, e.g. different utilitarian theories. The teacher could ask the students to write down three distinguishing facts of each of the theories covered. Desirable difficulties are created through the necessity to retrieve the information from (short and long-term) memory (e.g. the beginning of the semester) and to discriminate between similar concepts. But again: this may be too challenging for beginners and only create desirable difficulties for near-experts or experts. For beginners, *Power Tickets* that leave out interleaving and focus on (spaced) retrieval practice only are more suitable.

To additionally boost metacognitive skills and to minimize falsely remembered information, exercises like *Four Steps of Metacognition* can be used (Agarwal/Bain 2019: 138-145). In this exercise, students have to answer questions (retrieval practice and – depending on the questions – spacing and even interleaving) but also have to estimate their own knowledge by ticking if they are sure that they know the answer or not. They have to look for all the answers where they ticked that they did not know the answer or are not sure if their answer is correct, and they also have to control if they really got the answers correct of which they thought they had, that means.

Dietmar Hübner is partially right when he says in one of his videos: „In a textbook, it's pointless to ask reproductive questions. So, to ask what are the soul parts and the cardinal virtues in Plato's works is pointless because you can simply turn back to page 109 and there is the table in which you find this information."[10] But he is wrong when he implicitly thinks that this is the only option for reproduction tasks. If he would change the tasks in his textbook according to these principles, they could be very useful to foster the student's ability to

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[9] URL: https://www.youtube.com/watch?v=uRMxEJ5J6AY; 1:52–2:07; translation P.M. Accessed: 22 September 2020.
[10] Ibid.

reproduce information and more. For instance, by explaining the students how and why retrieval practice works and – to use the Plato example – by letting the students explicitly retrieve Plato's cardinal virtues and soul parts from their memory in a mini-quiz or a *Four Steps of Metacognition* when they first have to read the text and then – in form of a closed-book task – complete the exercise. This may look like the following:

Four Steps of Metacognition: Plato

☆	?	Items to Know	Answer
		Name the four cardinal virtues in Plato's concept.	
		Name the three parts of the human soul according to Plato.	
		…	

Figure 2. Four Steps of Metacognition Template[11] *adjusted to the Plato example.*

4. Basic and high-order questions

The exercises mentioned so far support higher-order thinking because students are better able to remember the learning contents when they have to apply, reflect, evaluate, and modify them. However, they are mostly basic questions that ask for factual recall, either word-for-word or in the words of the learners. In order not only to *support* but *train* higher-order thinking skills, one should also create higher-order retrieval practice (Agarwal/Bain 2019: 41-42). This again can be done by using the power tools to create exercises, for example the mini-quizzes but with certain changes.

To make mini-quizzes boost higher-order thinking the questions have to go beyond the recall of facts. They can be described as *sophisticated mini-quizzes* or, as Robert Loftis (2019) puts it, as *sophisticated multiple-choice questions*. They demand, for example, the correct application of learned information to new examples, the identification of the correct premises or conclusions of an author's position, or the ability to detect fallacies in an argument. To answer such questions, students have to use higher-order skills. They can therefore be used to train such

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[11] Taken from: https://www.powerfulteaching.org/resources. Last access: 22 September 2020.
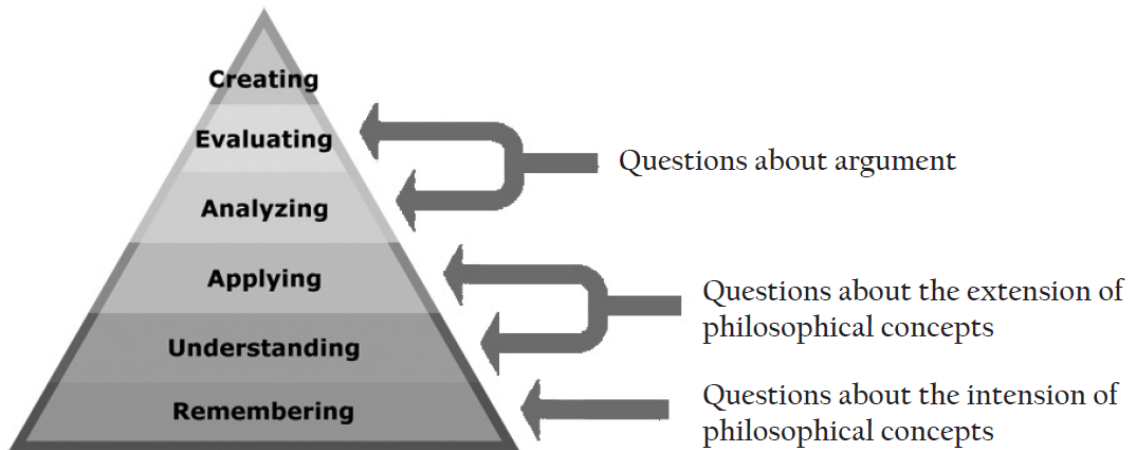
higher-order skills[12]:

Figure 3. Bloom's (altered) Taxonomy (Loftis 2019: 92)

Creating good sophisticated multiple-choice questions is not easy. The questions have to be unambiguous, and the answers have to be written in a way that the correct ones are not easily distinguishable from the wrong ones. Therefore, one has to include so-called *distractors*, i.e. answers that only look to be the correct answer to the question asked, so that students have to actively reflect about the correct answer (Loftis 2019: 93-94). This requires mental effort that activates deeper processing.

In his text, Loftis gives a lot of examples, of which I will present only two. The correct answers are the ones in italics. The first question demands the correct application of a position. I present it here in a slightly altered version (Loftis 2019: 113-114):

Cameron has always lived by the principle that the good of the many outweighs the good of the few. So, when they first heard about the classic version of the trolley problem, they thought it was obvious that one should throw the switch. But when they heard the fat man version of the trolley problem, they were perplexed. Cameron recognized the process they were going through as a case of reflective equilibrium and decided the thing to do was [...] [to reject][13] their intuition about the case. Which of the following best describes the outcome of their decision? (Select one)

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[12] It has to be said that Loftis (2019) sees multiple-choice tests as *assessment strategies*, not primarily as *learning strategies*. In this text, however, they are seen as a possibility to create higher-order retrieval practice since they demand students to retrieve *and* apply, analyze and evaluate.

[13] Originally it says: "Cameron has always lived by the principle that the good of the many outweighs the good of the few. So, when they first heard about the classic version of the trolley problem, they thought it was obvious that one should throw the switch. But when they heard the fat man version of the trolley problem, they were perplexed. Cameron recognized the process they were going through as a case of reflective equilibrium and decided the thing to do was stick to the rule, rejecting their intuition about the case. Which of the following best describes the outcome of their decision?" (Loftis 2019: 113f.). Thanks to one of the reviewers, I realized that the answer would be too obvious when it says "the thing to do was stick to the rule". Therefore, I cut it out so that learners who try to answer this question have to a) retrieve what the fat man version of the trolley problem says, b) retrieve what reflective equilibrium means and c) think what it implies in this version of the trolley problem if the intuitions are neglected.

a) Cameron will say you should both pull the switch and push the fat man.
b) Cameron will say you should pull the switch, but not push the fat man.
c) Cameron will say you should neither pull the switch nor push the fat man.
d) Cameron will say you should push the fat man but not pull the switch.

The students should be given a space to explain why they choose the answer so that, on the one hand, they have the chance to get points for ticking a wrong answer, when they have good reasons for it. On the other hand, it allows teachers to see if there was another way of understanding the question.

The second question asks students to analyze the arguments that Kant gives for his focus on a rational basis for ethics (Loftis 2019: 114-115):

Which of the following are reasons Kant gives for saying that Reason is the only thing that can serve as the justification and motivation for moral behavior? (Select all that apply.)

a) Emotions are not stable, so a morality motivated by emotion will not last.
b) Emotions have no cognitive content, so they cannot be used to judge right and wrong.
c) People who lack emotions are unable to find any meaning in life, so amorality without emotion would not motivate.
d) Emotions are closely linked to the right and wrong things to do, so a morality founded on emotion has more than an accidental link to goodness.
e) People who act out of emotion are only satisfying their own needs, so a morality founded on emotion has no moral worth.

By creating such questions and by mixing them up with basic questions, one can foster students' long-term retention of philosophical learning contents *and* train higher-order skills.

Conclusion

Of course, this is no promotion for the sole use of basic and higher-order retrieval practice in teaching philosophy. The basic and higher-order retrieval practice is a research-based possibility to foster students' long-term retention of philosophical learning contents, their metacognitive skills, as well as their skills in application (of concepts), analyzing, and evaluation.

But to see these possibilities, teachers in philosophy do not only have to focus on answering the questions of the didactics of philosophy that are close to philosophical questions, e.g. normative questions what philosophical education should aim at. They also have to focus on answering descriptive questions such as how to teach in philosophy so that what is taught is learned (best) and how to learn (best) (Pfister 2014: 117). To answer them, teachers can conduct empirical research themselves, or they can, like it was done in this text, investigate whether research holds findings that are relevant for them. In other words: teachers in philosophy should become what Concepción has called *scholary teachers*, i.e. "people who study research on teaching and learning and deploy what is learned in their courses" (Concepción 2018: 27).

Research on effective learning offers great insights that can be used in teaching philosophy. This can have a positive effect on the quality of philosophising since it supports higher-order

and meta-cognitive skills.[14]

References

Agarwal, Pooja / Bain, Patrice (2019), *Powerful Teaching. Unleash the Science of Learning*, San Francisco: Jossey-Bass.

Agarwal, Pooja / Karpicke, Jeffrey / Kang, Sean / Roediger III, Henry / McDermott, Kathleen (2008), "Examining the Testing Effect with Open- and Closed-Book Tests", *Applied Cognitive Psychology 22* (2008), 861– 876.

Anderson, Lorin / Krathwohl, David/ Bloom, Benjamin (2001), *A Taxonomy for Learning, Teaching, and Assessing. A Revision of Bloom's Taxonomy of Educational Objectives*, Boston: Addison Wesley Longman, Inc., Abridged Edition.

Barz, Wolfgang (2019): "The Aporetic Structure of Philosophical Problems", *Journal of Didactics of Philosophy 3* (2019), 4–18.

Bjork, Robert (1994), "Memory and Meta-memory Considerations in the Training of Human Beings", Metcalfe, Janet/Shimamura, Arthur (eds.): *Metacognition: Knowing about Knowing*, Cambridge: MIT Press, 185–205.

Bloom, Benjamin (1956), *Taxonomy of Educational Objectives*, Boston: Allyn and Bacon.

Brosow, Frank (2020), "TRAP-Mind-Theory. Philosophizing as an Educational Process", *Journal of Didactics of Philosophy* 4 (1) (2020), 14–33. URL: www.philosophie.ch/jdph. Last access: 22 September 2020.

Brosow, Frank / Luckner, Andreas (2019), "Ergebnisse der Expertenbefragung zu fachwissenschaftlichen Kerninhalten des Studiums der Philosophie und Ethik". URL: https://www.researchgate.net/publication/331354641_Studie_Brosow-Luckner_Fachwisse nschaft_-_FINIS/link/5c7558b4299bf1268d2825cb/download. Last access: 22 September 2020.

Brosow, Frank / Maisenhölder, Patrick (2019a), "Empirical Study Concerning Philosophical /Ethical Core Contents in Teacher Training", URL: www.researchgate.net/publication/ 331261142_Empirical_Study_Concerning_PhilosophicalEthical_Core_Contents_in_Teach er_Training/link/5c75841e458515831f729047/download. Last access: 22 September 2020.

Brosow, Frank / Maisenhölder, Patrick (2019b "The Unexamined Course is not Worth Giving – The Benefits of Empirical Research for Teacher Training Curriculum Design", *Proceedings of ICERI 2019 Conference, 11th-13th November 2019*, 4045–4053.

Brown, Peter / Roediger, Henry / McDaniel, Mark (2014), *Make it stick. The Science of Successful Learning*, Cambridge/London: The Belknap Press.

Concepción, David (2018), "Learning to teach", Kahn, Steven / Bradner, Alexandra / Mills, Andrew (eds.): *Philosophers in the Classroom. Essays on Teaching*, Indianapolis/ Cambridge: Hackett, 20–33.

Dunlosky, John / Rawson, Katherine / Marsh, Elizabeth / Nathan, Mitchell / Willingham, Daniel (2013), "Improving Students' Learning with Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology", *Psychological Science in the Public Interest 14*, 4–58.

Kahnemann, Daniel (2011), *Thinking, fast and slow,* New York: Farrar, Straus and Giroux.

Lang, James (2016), *Small Teaching: Everyday Lessons from the Science of Learning*, San Francisco: Jossey-Bass.

Loftis, J. Robert (2019), "Beyond Information Recall: Sophisticated Multiple-Choice Questions in Philosophy", *American Association of Philosophy Teachers Studies in Pedagogy 5*, 89– 122.

Metcalfe, Janet / Finn, Bridgid (2012), "Hypercorrection of high confidence in children", *Learning and Instruction 22* (2012), 253–261.

Merkt, Martin (2016), "Perzeptuelle Disfluency", Schwan, Stephan / Unz, Dagmar / Suckfüll, Monika / Krämer, Nicole (eds.): *Medienpsychologie. Schlüsselbegriffe und Konzepte,* Stuttgart: Kohlhammer.

Pfister, Jonas (2014), *Fachdidaktik Philosophie*, Bern: Haupt Verlag.

Roediger III, Henry / Butler, Andrew (2011), "The critical role of retrieval practice inlong-term retention", *Cognitive Sciences 15(1)*, 20–27.

Roediger III, Henry L. / Karpicke, Jeffrey (2006), "Test-enhanced learning: Taking memory tests improve long-term retention", *Psychological Science 17*, 249–255.

Roeger, Carsten (2016), *Philosophieunterricht zwischen Kompetenzorientierung und philosophischer Bildung*, Opladen, Berlin und Toronto: Verlag Barbara Budrich.

Tibus, Maike (2008), "Amount of Invested Mental Effort (AIME)", Schwan, Stephan / Unz, Dagmar / Suckfüll, Monika / Krämer, Nicole (Eds.): *Medienpsychologie. Schlüsselbegriffe und Konzepte*, Stuttgart: Kohlhammer, 96–101.

Weinstein, Yana / Sumeracki, Megan (2019), *Understanding how we learn. A visual guide*, New York: Routledge.

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