**Module I: Learning to learn - the role of these competences in future professional life**

Topic 1.1 – Learning to learn - theory and techniques of effective learning

**Topic 1.1 The learning process**

1. Introduction and Self-study

Video 3 min – Scenario - appendix 1

Video 10 min – <https://www.youtube.com/watch?v=kLL-cH8jyxc&fbclid=IwAR2wjlcVhPkLrCZvtLkv3H7-2miI6FHHMPF1BTjITy7xmA9ih41G86rxk5E>

1. Forum

**Theoretical introduction**

Literature from the field of neuroscience and cognitive psychology gives a lot of practical information about why learning is so important. It may seem that both academic staff and students of lower-level studies have a natural and developed ability to learn. In fact, also people professionally involved in the need for permanent learning, often have gaps in knowledge about how to learn effectively.

Research in the field of broadly understood learning is still ongoing, but it becomes clear that when students first focus on a problem to be solved or a concept that needs to be understood, their brains use limited knowledge of neural pathways. When a problem or concept that is easy to grasp arises, we use paths we know well (Oakley, 2015). Our memory and how memory processes take place, are responsible for this.

Colloquially, memory seems to be something simple for people, it is comparable to a device that saves and restores data. On the other hand, memory is a complex system resembling the most important human organs, e.g. the heart (Baddeley, 1993), it is a complex structure, both due to the diversity and number of components, and due to their functionality. It is a set of information, where each is assigned to a description of selected reality, and additionally contains references to subsequent information. The brain saves each position with simple symbols. In addition, the memory contains a record of events that we experienced or experienced by our loved ones. It is a sequence of scenes that are more or less specific in nature. The scenes are connected chronologically, and also by a cause and effect relation, and the memory record is multi-threaded (Maruszewski, 2011). Therefore, it would be very shallow to compare memory to tape or recording on a hard disk (Woodworth and Schlosberg, 1963; Maruszewski 1996). Man uses memory mainly to protect himself from unpleasant situations and achieve goals that are important to him (Baddeley, 1998). In addition, memory allows us to perform cognitive operations regarding thinking, perception and attention. The main function of memory is perception and action (Glengerg, 1997), it aims to facilitate interaction with the environment so that, in combination with direct perception, full adaptation to the situation is possible. Psychology sees memory in two ways:

1. memory, as an ability understood as "mental power", Sternberg (1996) referred to this approach by defining memory as follows: "Memory is a set of means by which we reach into our past experiences, thanks to which we can use this information at present" (p. 222),
2. memory, as a mental process consisting of specific phases (occurring in the same order), occurring at a specific time. "As a process, memory refers to dynamic mechanisms related to the preservation and reproduction of information about our past experiences (Sternberg, 1996, p. 222).

The memory consists of three types of operations: coding, storage and playback. Playback seems to be the most accurate term for memory because the information played back from memory is different from what was stored in it. Much depends on how you reach into our memory and how you summon different content. Thus, the term "playback" indicates that information may be partially re-created from fragmentary data stored in memory (Maruszewski, 2011).

It happens, however, that we come across a situation that is difficult to fit into one of the paths of action or thinking known to us. It is important to stop focusing on the problem and allow neurons to start processing data. People who do not understand the need to change the way they focus their attention are becoming increasingly frustrated because the paths their neurons use in a given task are inappropriate for this task (Oakley, 2015). Important insights from the area of ​​cognitive psychology appear in the topic related to better learning. It has been shown that a simple recall technique is much more efficient than re-reading, highlighting or mapping concepts enabling students to capture difficult material.

**Memory processes**

Recommendation of the European Parliament and of the Council of December 18, 2006 defines learning ability as "the ability to pursue and persistently learn, to organize one's own learning process, including effective time and information management, both individually and in groups (...) This competence includes awareness of one's own learning process and needs in this area, identifying the opportunities available and the ability to overcome obstacles to succeed in learning. This competence means the acquisition, processing and possessing new knowledge and skills, as well as the search and use of guidance. Learning how to learn allows individuals to acquire the ability to use previous learning experiences and general life experiences to use and apply knowledge and skills in a variety of contexts - at home, at work, as well as in education and training. (...) The key factors in developing a given person's competence are motivation and faith in their own abilities "(Goetz, 2016). Several recent studies have shown that many college graduates have neither a high level of general knowledge nor the knowledge needed to function in today's society (Fink 2003). Saunders (1980, after Wirth, Perkins, 2013) compared students from one American university who completed a one-year course in economics with those who had never dealt with economics. The result difference is only 20%, which has been decreasing with each subsequent year since completing the course.

According to Bloom, the acquisition of facts (knowledge) is only the beginning of understanding. The facts must remain:
• understood
• applied (for new situations)
• analyzed (systematized)
• synthesized (ability to create new ideas)
• evaluated (determining the advantages and validity of the information or idea.

Of course, to achieve the appropriate level of understanding that makes "assessment" possible, you need considerable time and effort from the learner. Such a deep level of understanding is not easy to achieve by reading a book or listening to a lecture. It requires active thinking and reflection.
There are four categories of knowledge (Anderson et al., 2001) within the cognitive domain, each of which requires a different type of learning: factual, conceptual, procedural and metacognitive.

* Factual knowledge is the isolation and isolation of content elements, in organizations it is usually recorded in databases and data warehouses, respectively. e.g. "Jan Kowalski bought a TV set for PLN 2,275 on September 23, 2010" or "Jan Kowalski owns a TV set worth PLN 2,275 purchased on September 23, 2010"
* Conceptual knowledge is more complex and organized, it includes knowledge of classifications, categories, principles, theories, models and structures. The ability to perceive an organization as a whole is expressed through conceptual knowledge. In short, it is knowledge that allows you to integrate and coordinate the activities of many people to achieve a goal.
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* Knowledge of "how to do something", so techniques, methods and skills are called procedural knowledge, eg: "Jan Kowalski bought a TV set for PLN 2,275 on 23/09/2010" describes the event, the purchase of a TV set. The sequence of events is a process. Knowledge about processes (and sometimes their states) is called procedural knowledge.
* Metacognitive knowledge is "knowledge about knowledge as well as awareness and knowledge about one's own knowledge. "

In response to the need for further consideration of the learning process, Fink (2003) proposed: 'significant learning' taxonomy that covers both cognitive and affective aspects. This taxonomy was developed to emphasize that learning is associated with changes in the student. Significant learning is characterized by "some kind of lasting change that is important for the student's life." Basic knowledge includes knowledge and understanding of basic facts, ideas and perspectives, as well as understanding the conceptual structure of factual knowledge within a subject. Basic knowledge is also necessary for other types of learning, hence the fundamental term. In addition to recalling information and ideas, you should also be able to use the acquired knowledge in new situations. This category includes learning to engage in new types of thinking (critical, creative, practical) as well as certain skills (e.g. communication, playing an instrument). It refers to critical thinking, discussed in more detail below, to the process of analysis and evaluation, while creative thinking is the process of creating new ideas, projects, products or forms of expression (Sternberg 1989; cited in Fink 2003). Practical learning occurs when basic knowledge is used to answer questions, solve problems or make decisions. There is real intellectual power in Fink's taxonomy, which relies on the possibility of creating connections between specific ideas, people and various areas of life. This includes interdisciplinary learning, learning communities and combining academic work with other areas of life. The human dimension of learning describes the type of learning that occurs when a student learns something important about himself or what he would like to become. This self-awareness enables better understanding of oneself and the ability to function in society and interact with others. This type of learning (human dimension) is essentially similar to "emotional intelligence," which Goleman (1998; quoted in Fink 2003) describes as involving self-awareness, self-regulation, motivation, empathy and social skills. Both authors point out the importance of understanding yourself and others. When the learning process has a profound impact on the student, it gives more sense to devote time and effort to learning the subject or learning in general, and also leads to new interests, changes in value and commitment to learning. Finally, it is also important to learn so as to learn. This includes learning how to diagnose your own learning needs. This type of learning allows students to continue learning, increasing its effectiveness. Most traditional courses and curricula are designed for students with basic knowledge and the ability to learn independently after graduation. The most important thing in developing these aspects of learning is remembering that much more is needed to learn than memorizing, recalling, and even understanding and facts. Science is not only content, you also need to know how to apply knowledge in new areas, how to integrate knowledge with other aspects of life, it is necessary to understand the implications of knowledge for yourself and others, awareness of the importance of learning and how to learn to learn. None of these categories of learning can be ignored because learning in one area improves learning in other areas (Fink 2003).

**Attention**

It is a mechanism that allows us to perceive some of the stimuli, as well as resemble some of the previously encoded information. Note, it is a mechanism to reduce information overload that is able to process a fraction of the information available. Controls the process of receiving and processing information in order to avoid overloading and the effects of excess information being received. Attention starts only one of many possible thinking processes and performs one of many possible reactions. Note performs the following basic functions:

• Selecting stimuli reaching the individual.
• Orientation of cognitive processes.
• Determining the amount of cognitive resources used devoted to the implementation of various tasks.

Each organism receives a huge amount of stimuli, which exceeds its processing capabilities. Some stimuli are of great importance, others just the opposite, which is why selecting the information received as useful and less useful is so important. We can distinguish three types of selection: primary, secondary and third-order selection.

* Primary selection is the selection of stimuli received by the senses.
* Secondary selection occurs between short-term memory and persistent memory because persistent memory cannot receive all the stimuli sent by short-term memory. The essence of this selection is the process of weakening information that the individual considers not important.
* Third-order selection processes occur when an entity, using knowledge stored in non-volatile memory, prepares an action plan. Then the information selected from non-volatile memory is sent to the main memory, which directs some selected action.

Orientation of cognitive processes - attention not only separates important and unimportant information, but also looks for information that may be useful in solving various problems. This function is associated with the processes of perceptual and cognitive exploration.
Attention defines the resources needed to perform a given activity and determines how much mental energy we devote to performing a given task. For very important tasks, a person is able to devote a significant amount of energy to their implementation. In less important tasks, energy involvement will be much smaller.

**Attention – maintaining concentration in learning**

A common problem in acquiring knowledge is distraction due to difficulties in maintaining attention. Ron Davis was born with severe dyslexia, and thanks to his method of focusing attention he became an expert in the field of speed reading. He found a way that can significantly reduce the power of dyslexia, which is to change the mental center of perception. For this you need to be able to look at yourself from the side, imagine your figure, how we sit, how we have our body system, the face, and the activities we do at the moment. Then follow the instructions:

1) Imagine you feel an orange in your hand.
2) Put this orange near the top of your head, leave it there.
3) Close your eyes and focus on this orange, try to feel it, how it touches your head.
4) Open your eyes and still imagine that this orange is with your head
5) Then, without focusing on the oranges, start doing what you planned.

Subconsciously, your thoughts have been ordered and focused, and your mind cleared, allowing you to focus more on your next task. The whole technique takes from 10-30 seconds.
There is a very easy way to measure it. By regularly using the technique, your reading pace should increase.

Richard Feynman has developed a method that involves the following steps:
• Topic identification: writing down information available for the learner on the topic and then trying to pass on this knowledge to the child. If it succeeds, it means that the basics are only mastered.
• Identification of knowledge gaps: real learning takes place here.
• Data organization + simplification + telling the story.

A good way not to have to read the same text several times to understand it is to use the Richard Feynman method in a slightly different edition: read the short paragraph of the book and then tell it in your own words. This requires additional concentration, because we know that we must remember and understand as much detail as possible in order to be able to answer what follows from the content of the text.

Barbara and Phil Oakley developed 'Learning to Learn', involving various types of brain work and attention span, helping to explore new levels of learning.

Oakley uses a lot of metaphors, which he claims help to look at the problem from a different angle. Her methods are less conventional than standard university methods for presenting scientific theories, for example, she illustrates her concepts with silly animations: surfing zombies, metabolic vampires, and "attention octopus." Oakley emphasizes that everyone can learn to learn, and the main barrier is the student's lack of faith in his or her skills, which significantly affects his or her approach to learning. A student who looks at the task and finds that he can't figure it out says about himself: "I'm really stupid!" And he just doesn't know how his brain works. Teacher empathy can be helpful, especially for students who do not believe in their strength. Oakley has created four effective learning techniques:

- FOCUS / DISTRACTION - The brain has two modes of thinking: "focused" in which students focus on material and "distracted", neural rest in which consolidation occurs - and new information can settle in the brain. In distributed mode, connections between pieces of information and unexpected results may occur. The brain rests from a state of concentration, which allows a broader view of the situation, change the context, or "look at the task from a different angle." The application of the method involves nothing other than taking regular breaks between the moments of maximum focus during work.

 - TAKE A BREAK - To achieve a period of focus and distraction while thinking, Oakley recommends Pomodoro technique, developed by F. Cirillo ("Pomodoro" is a tomato in Italian - some timers look like tomatoes).
Set the timer for 25 minutes and concentrate on work during this time, and then take a break to distract your thoughts. Distraction is treated as a reward, it can be - listening to a song, a walk, anything that allows you to enter a state of relaxation and break away from the task. This will allow you not to think about the task, and then the brain can subconsciously consolidate new knowledge. Oakley compares this process to "a librarian putting books on shelves for later retrieval." The timer setting ritual can also help you overcome postponing work for later. Even thinking about doing things that we don't like activates pain centers in the brain. The Pomodoro technique, "helps the mind concentrate and start working without thinking about work. "

- PRACTICE "Chunking" - is the process of creating a neural pattern that can be reactivated if necessary. It can be an equation or phrase in French. Research shows that having a mental library of well-trained nerve fragments is necessary for developing specialist knowledge. This practice speeds up the learning process. Mastering mathematical concepts on initially low levels of difficulty makes it possible to solve increasingly difficult problems that require mental acrobatics. The main goal is to acquire new, more difficult information.

**Effective learning**

- Focusing is extremely important in the learning process. A distracted mind that is bombarded with various stimuli from many sources is more fallible. When we perform various activities, the schedule is filled with tasks of various types, and in addition, less anticipated stimuli may appear, these are all things that conflict with each other and focus. The key is getting rid of conflicts. In science, when we have to assimilate content in various forms, i.e. the following concepts, dates, cause-and-effect sequences, etc., it breaks the focus necessary for learning. The way to eliminate these conflicts is to group the material that we are to assimilate into similar collections. In this way, the brain will be fully focused on one way of acquiring information, and after its completion will smoothly switch to the next, and thus will register all necessary data and maintain focus and efficiency.

- Monotasking - research has shown that because of how our mind processes data and gives instructions, there is no such thing as real multitasking = multithreading. The mind has one thread and divides its attention into microportions and jumps from topic to topic. Neuroscientists estimate that multitasking slows us by half and significantly increases the chance of making a mistake, e.g. driving a car drivers talking on the phone press the brake half a second later than those who do not speak on the phone, which at an speed of 100 km / h gives an additional 14 m to stop. The same principle applies to learning, and multitasking significantly slows it down, because every work requires concentration. So let's assign activities a clearly defined time, e.g. learning a language: I devote the first two hours to learning vocabulary, the next two to learning grammar, and the rest to listening to recordings in the chosen language. It is also a way to match unpleasant but necessary tasks - that is, to do them quickly in a certain time. It should also be remembered that, just like in science, you should focus on rest, during which distractions (distractions) should also be avoided.

- In the learning process, it is important to maintain motivation and focus on what is most important. It will help us to ask ourselves three simple questions: about the purpose of the action, its benefits and curiosity that it possesses. Such self-surveys help build confidence in what we are going to learn. This applies to both long- and short-term goals, complex projects and small daily tasks.

- Using your imagination to associate certain things with you. It often happens that you have to learn difficult terms, listed one after the other, often boring to tell. A good way to remember them is to come up with a movie / story that will guide us through these terms in turn. Monotonous exchange sounds different, almost impossible to remember after the first hearing, and a story that contains the given elements in turn and combines them into one coherent whole. History can contain as many fantasies as necessary. This technique is very useful with a large number of words to remember, a cause and effect sequence, or with difficult mathematical, chemical or physical formulas.

- Anchor. While learning, we come across many details - to remember the course of e.g. the Battle of Grunwald, it will be much easier to remember the course of the battle, which will be firmly anchored in memory by means of imagination. This will enable us to a scheme called EES (exaggeration and energy senses): Senses - first we move the senses, i.e. we imagine the smell of horses, sweat of soldiers, dust on the face, the sound of sabers reflecting on each other.

Exaggeration - the knights of one side can be, for example, much larger than the other, or they can be distinguished by their custom color of armor, they can also mount ridiculously small horses.
Energy - to add energy / action to the situation, the battle should live, the sabers collide, the soldiers should run ahead, and those wounded fall off their horses and fall over with a scream.
Giving these features will allow you to remember the term for a long time, because it engages many senses at once.

- Sorting information by using existing paths in your head, e.g. you can correlate the order of your speech with your daily path from bed to work and back. It is worth focusing on correlating, because people have a very good long-term memory associated with several routes and regular activities, which can be a useful tool even for learning the most complex memory.

It is important that with the selected learning system everything is clear and understandable for the learner, so that it can be used freely.

- Saw effect - it results from the simple fact that after taking a break from performing a given task, the mind needs a long time to be able to return to work, e.g. after returning from a lunch break or after a short conversation with a work colleague we have to "gather our thoughts again ". The more often we break away from a given task, the more time it takes us to complete it and the worse we work. As a result, the graph of our working time resembles a saw blade.



Statistically, 28% of the time spent on completing the task is wasted. An effective way to maintain concentration while learning will be to give up anything that can lead to a break in concentration.
Similarly, other memory techniques work, although depending on their individual characteristics, they have different applications. However, any effective learning technique requires repetition because it undergoes the same forgetfulness processes as other elements. Such replays take little time because they are just a mental exercise. Training also requires the ability to put information in the right places, as well as the ability to look into these places and extract the information we need.

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