## Lesson Plan: Memory and Learning

**55 minutes total**

Lesson Description



In this lesson participants observe how information moves from the sensory, to the working and the long-term memory, and discuss the concept of cognitive load.

Learning Outcomes



At the end of this session participants will be able to:

1. Explain how information moves from the sensory to the long-term memory.
2. Define cognitive load.
3. Discuss how to apply their understanding of memory systems to the design of their workshop.

Materials



* Flip chart paper
* Markers
* Tape
* CEWT Workbook – 1 per participant
* Coloured paper
* Two foods with distinct smell, for example peanut butter and coffee
* An object to feel that will be identifiable
* An object to feel that is not easily identifiable
* Small objects of different colors to represent pieces of information
* A bunch of bananas – or something else that a participant can eat or fill their mouth with to illustrate the concept of cognitive load
* 3 chairs
* A box or basket

Preparation



* Write the learning outcomes on flipchart paper
* Prepare a flipchart with the heading “Memory Systems” and the memory systems diagram in this lesson plan
* Write the following on separate pieces of white paper: Sensory Memory, Working Memory, Long-Term Memory
* Write the following on coloured pieces of paper, 1 per paper, and then crumple the papers into a ball: Physical security, emotional security, interesting, useful, brings pleasure
* Crumple at least 6 pieces of white paper into balls
* Place the objects that you want people to feel into a box or container that people can put their hands into to feel the objects

Introduction 5 minutes



1. Ask the participants to close their eyes. Go around to each participant and ask them to feel or smell the objects and identify them. Share as a group.
2. Ask the participants: “How did you identify the objects?” *They connected what they were feeling or smelling with something they already knew (something that was already in their memory) to try to identify the new object.*
3. Explain that in this lesson participants are going to discuss how memories are formed, and how we retrieve information from our long term memory.
4. Share the learning outcomes or lesson description.

Memory Systems 5 minutes



1. Ask for 5 volunteers to take the following roles:
* 1 person = Sensory Memory
* 2 people = Working Memory
* 1 person = Long-Term Memory

Note: If you have very few participants you can use one person in the role of working memory.

1. Set up three chairs/ small tables in a row, and tape the signs: sensory, working and long term memory to them, in the order shown in the diagram below. Tape the diagram below to the wall behind the chairs.
2. Ask the volunteers to stand behind the chair/table with their corresponding role.
3. Hand out the crumpled balls of paper to the remaining participants.
4. Explain that the volunteers represent our 3 memory systems: sensory, working and long-term memory. Explain that there isn’t a specific location in our brain with these three functions. Rather this is a model that helps explain how we remember information.
5. Explain that with the help of the volunteers representing the memory systems, you are going to show participants how information moves from the sensory to the working and the long-term memory.

Sensory Memory

Long-Term Memory

Working Memory

Sensory memory 5 minutes



1. Ask the volunteer representing the sensory memory to take out the camera on their phone. Place a basket or box on the chair beside them, and ask them to stand close to it.
2. Ask the participants. “How does the sensory memory take in information?” Through the senses: touch, taste, smell, sight, hearing.
3. Tell the participants with the crumpled balls of paper that their balls represent information coming into the sensory memory. Ask them to toss their balls of paper, at the same time, into the box or basket that is on the sensory memory chair. As this is happening the volunteer representing the sensory memory should take a picture of the balls coming toward him/her.
4. Ask the participants: “What did you observe?” *The sensory memory captured all of the information that was coming toward it. The information was captured in the photo and in the box.*
5. Explain that the sensory memory captures information for a few seconds, so that the working memory can pull out what is important. For those that are social media savy you can relate this to “Snap Chat”.
6. To further elaborate on the sensory memory, ask participants if they ever stopped paying attention for a few seconds while someone was talking. Ask them whether, if once they refocused on the conversation, they could remember the last sentence or two that the person had said. Explain the sentences they remember are an example of the sensory memory at work. The sensory memory retains information for a few seconds, but if it is not picked up by the working memory, it is dropped.
7. Another example of sensory memory is when you stare at something that is brightly lit, and can see if for a few seconds when you close your eyes.

Working Memory 10 minutes



1. Tell participants that they will now observe how information moves from the sensory to the working memory.
2. Tell one of the people representing the working memory to take the balls of paper out of the box one at a time. Ask them to toss the white balls of paper on the floor, and pass the coloured pieces of paper to the other person representing the working memory.
3. The 2nd person representing the working memory should juggle briefly with the coloured piece of paper, then set it on the chair representing the long term memory.
4. After they have had the opportunity to observe for a few minutes ask the participants to describe what the working memory was doing. *It selected some of the pieces of information, juggled (practiced) with them, and then moved them to the long term memory. Other pieces of information were discarded (tossed on the floor).*
5. Ask the participants “why did the working memory toss out some of the pieces of information, and move others to the long-term memory?”. *The working memory took the important pieces of information, and discarded the rest.*
6. Unravel the pieces of coloured paper, and show the participants what is written on them: *Physical security, emotional security, interesting, useful, brings pleasure*
7. Explain that our working memory prioritizes information related to these things. Provide some examples. Physical security: *Getting to shelter during a storm; Emotional security: a child running to their mom when they are scared up upset; Interesting: a novel object that appears on the street in your walk home; Useful: a tool in a hardware store that you need to fix something; Pleasure: a delicious sweet in the market, or someone who is very attractive.*
8. Explain that if we want what we are teaching to be remembered, the first thing we need to do is to ensure that it is prioritized by the working memory. We can do this by ensuring the information we provide is novel, interesting or useful.
9. Explain that the working memory has a limited capacity, which is why it can only select some pieces of information. Explain that we will discuss this in more detail later.
10. Ask participants, “what needed to occur for information to move from the working to the long-term memory?” *The volunteer had to juggle it.*
11. Ask participants, “what did the juggling represent?” *Practice.*
12. Explain that to move information to our long-term memory we need to practice with it, and connect it to existing knowledge and experience.
13. Ask participants, “how can we practice with information”: *We can talk about it, draw something with it, use it to solve a problem, create something with it, etc.*
14. Ask participant to discuss with a partner how information gets from the sensory to the long-term memory.

Long-term memory 10 minutes



1. Tell participants that we are now going to observe what happens to information in the long-term memory.
2. Ask a volunteer representing the working memory to grab a ball of paper from the long-term memory chair and start juggling with it. At the same time, ask a volunteer representing the long-term memory to create a line of masking tape between the long-term and working memory chair.
3. Ask the working memory volunteer to return the ball of paper back to the long-term memory chair. As this happens ask the long-term memory volunteer to create another line of masking tape between the two chairs.
4. Repeat this exercise a few times with the same ball of paper, until there is a thick line of masking tape between the two chairs.
5. Ask participants: “What did you observe?” *The more frequently we retrieve something from the long-term memory the thicker the line of masking tape.*
6. Ask participants: “What did the masking tape represent?” *A neural network.*
7. Explain that when we move information to the long-term memory we are creating a neural network. This is a connection between different neurons in our brain.
8. When we first learn something the information is a bit unstable and difficult to retrieve from our brain. As we use the information more and create more connections to it, it’s increasingly easy to retrieve. The thick tape represents these strengthened connections.
9. Explain that information in our long-term memory is a bit like a treasure in a forest. When we first put it into the forest, if we don’t use it again for a long time, the trail to the treasure risks being overgrown. It doesn’t mean our memory isn’t there, it means it’s difficult to find and retrieve. The more frequently we use the information, the bigger the path in the forest becomes and the faster we can retrieve the information.
10. Ask participant to turn to a partner and explain how we can support participants to remember the information we teach them? *Ensure that what we share is relevant and important, so the working memory picks it up. Connect the information to past experience, and ensure there are many times for a participant to practice so they can get information to their long-term memory. Practice retrieving the information multiple times during a workshop or course so they can remember it easily.*
11. After the pair conversations, ask participants, “Why did I get you to explain to your partner how to help participants remember information”. *So they could practice with the information and move it to their long term memory.*

Cognitive Load 10 minutes



1. Tell participants that they are now going to look in more detail at the working memory and it’s limitations.
2. Ask for a volunteer that is hungry and likes bananas (or the other food that you brought). Take the bunch of bananas and say it represents pieces of information. Ask the volunteer to take a banana and start eating it but not to swallow.
3. Ask the participants: “what does the volunteer taking the banana and moving it into their mouth represent?” *The working memory taking information from the sensory memory.*
4. Tell the participant to start eating the banana. Ask the participants, “Did the volunteer take the whole thing in their mouth. Why or why not? *They took bites because it is easier than eating it all at once*
5. Ask the participant, “what does this action represent?” *Chunking of information into smaller parts.*
6. Ask the volunteer to chew the banana, but not to swallow. Ask the participants, “what does this represent?” *Practicing with the information in the working memory.*
7. Ask the volunteer to start swallowing. Ask the participants, “what do this represent?” *Movement of information into the long term memory.*
8. Ask the volunteer to take another bit of banana, start eating it and not to swallow. Ask them to continue to take bites of the banana, but to keep it in their mouth until their mouth is overfull. Ask the participants, “what will happen if more and more banana keeps entering the volunteers mouth?” *Their mouth will become overloaded and the banana will start spilling out. Some of the banana will have to be discarded for the volunteer to be able to keep chewing and swallowing the banana.*
9. Explain that like the volunteer’s mouth, our working memory can take in a limited amount of information. In fact, it can only take three to five chunks of information at a time. Anything more is discarded. The capacity of the working memory is called *cognitive load*. We should remember this when trying to cram a lot of information into our workshops. If we try to cram in too much it will be forgotten, so it’s better to focus on less information and ensure it is consolidated.
10. Ask participants: “have you ever been overwhelmed with information to the point that you could not take in anymore? When?” *Some examples could be long lectures at University classes, or very long directions.*
11. Ask the participants to explain to their partner what happens when we try to cram too much information into the long term memory.

Review 10 minutes



1. With a partner ask participants to discuss the following questions: “How will you apply your understanding of memory systems to the design of your workshop?”
2. In their CEWT Workbooks, in the Learning Theory section, under the title “Memory and Learning” ask participants to draw a picture or diagram to represent each of the memory systems and how information moves between them.

Reflections on Lesson