Learning & Memory

British Neuroscience Association

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Background

The aim of this session is to introduce students (aged 5-11) to learning and memory. Students will have the opportunity to discuss what they already know about the brain, understand what learning and memory are and the different types of memory. This information sheet should be used in conjunction with the 'Primary-Learning & Memory PPT' PowerPoint presentation.

Introducing the Brain 'Scientist says'

(Slide 1) Title slide. **(2)** A great way to start any session is to get the students moving around. Based on the familiar children's game 'Simon says', 'Scientist says' will introduce the students to the brain, its multiple functions and allow you to explore their previous knowledge and level.

Ask the class to stand up and find some space around them. Although the rules may be familiar to them, reiterate that they must only carry out the action when you begin with 'Scientist says'. Ask each student to sit down when they incorrectly carry out an action without 'Scientist says' included beforehand.

Possible actions could include: Wave your left arm, lift your right leg, wiggle your nose, stick out your tongue.

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When the game is complete, instruct students to sit down and ask them what they think is responsible for carrying out these actions (you may encourage answers of the brain by pointing to your own head). Emphasise that the brain has many jobs, not just in making actions happen but also stopping them as well.

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(3) Ask the students what else they know about the brain. This is also a good opportunity for you to inform the students on some interesting brain facts, including:

- 'The human adult brain is just a bit heavier than a bag of sugar' (1.3kg).'
- 'The top of the brain looks similar to a walnut with a wrinkly part on top. If the brains wrinkles were spread out, it would be about the size of 4 pieces of paper' (A4).
- 'The brain floats around in a clear(ish) liquid, like water, protected by a hard skull because it is soft and may be damaged easily.'

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(4) Ask the students what they think the machine is/ does. Inform them that this is a brain scanner and allows scientists to see inside people's heads and their brains, as shown in the accompanying MRI image.

(5) With the latest technology we can see how the brain is connected, like in this video.

Summarise by informing the students that the brain is the control centre for the body and incredibly important for everything we do. It makes us who we are!

Tip: Visual aids (e.g. model of the brain) may help you keep the attention of the students and boost your own confidence. If a screen is available, you could use a 3D brain model such as the one found at brainfacts.org/3d-brain.

Roche

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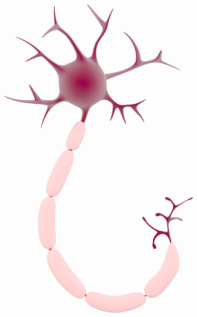
What is learning & memory?

(6) Ask: How do you know what you had for dinner last night? Take suggestions and encourage the answer of memories. Ask the students to suggest what memory is. Inform the students that memory is the way in which our brains store information. Learning is the process of gaining new information and skills.

(7) For example, you have the alphabet in front of you. You learn the alphabet, perhaps by reading it, perhaps by learning a song. The alphabet, which you have just learnt, is then stored in your memory i.e. we make memories of things we have learnt. If you didn't have memory, everything that you learn would just disappear.

Inform the students that learning and memory allows you to learn words so you can read, or learn how to cook so you can feed yourself. You may also learn that something is dangerous, like running across a road.

(8) But, what actually is memory? How can this thing in your head hold all this information and all these events? Inform the students that memory is about connections. Ask the students to suggest what type of cell they can see on the slide. Take suggestions leading to brain cell or neurons. Inform the students that there are billions of these in our brain. To make the brain work, they have to talk to each other and make connections.



When you make a memory, a neuron will connect with another neuron or their connection will become stronger.

(9) Some memories will involve many neurons talking to each other in something called a network. There are millions of these networks in our brain, forming connections and holding information we have learnt or experienced. When you remember something, that network of neurons starts talking again and becomes even stronger.

There are different types of memory

What/When memories

(10) Begin by asking the students when their birthday is and what they did for it a year ago? Take suggestions. Next, ask the students if they can remember what they had for dinner, a year ago today. Inform the students that they can probably all remember their birthdays and the birthday parties that they may have had, because our brains are very good at remembering important things, especially those that don't take place very often. We may also feel strong emotions during that event, e.g. being happy to be with our friends or receiving a really nice present. But you aren't likely to remember everything from a long time ago, like what you had for dinner a year ago, because that would be too much information for the brain to remember. Therefore, the brain forgets a lot of information that isn't important because we don't need it.

Inform the students that we may call these sorts of memories - what/when memories. What happened? When did it happen? We can say these things out loud and tell people about them.

Activity - Memory game

(11) In the next activity, students will play a game to test their memory. Eleven items will travel across the screen and they have to remember as many as they can. Once the last item has finished moving across the screen, allow the students 1-2 minutes to write down as many items as they can.

(12) Once complete, show the students what the items were.

(13) Using the graph, edit the data by clicking on 'Chart Tools', 'Edit Data' and counting how many students remembered each item. Complete this for all items. If you are presenting to multiple classes or carrying out this session more than once, you can average all the data you collect.

Looking at the graph, inform the students that when you carry out similar tasks with many students, you will start to notice interesting results. For example, our brains tend to remember things at the beginning and end of a list. The brain also remembers unusual items, like Harry Potter. This is useful if you are teaching people, as you may put the most important information at the start or finish of a lesson, and do something unusual in the middle that students would remember.

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(14) Inform the students that in addition to these what/where memories, we also have how memories. Ask the students to suggest other things they learn, apart from facts and events. What are the first things they learn to do in their lives? Take suggestions and inform the students that how memories are the actions we learn to do. For example, we learn how to walk, ride a bike, play an instrument. When we learn how to carry out these actions, the brain will make memories of these actions so we can do them automatically without thinking in the future.

(15) In the next demonstration, you will show the students how to do a magic trick where a pen/pencil appears to be bendy. Instructions for this can be found if you search for 'bendy pencil trick' on YouTube. Teach the students how to do the trick and inform them that this is a very simple 'how' memory that they have learned.

(16) Summarise the session as outlined on the slide.