

Lesson Plan

NEUROHEADWAY

Neuroscience Into Education

Slide	Subject	Description	Timing
2	Registration and brief introduction to lesson.	Today we are going to discuss what happens in our heads so that we can communicate with our family and friends. You will be surprised that your brain is an entire world which functions so that you can do the things you do all the time! Let's begin!	2 min
3, 4	Brain and neurons (Activity)	Inside our heads, there is a big gray and white organ – the brain. The gray stuff is called “neurons”, and the white stuff – “microglia”. Both neurons and microglia are cells which serve our body in a certain way. More specifically, neurons help us perceive the world, think, experience emotions, and act. Microglia support the work of neurons. Imagine the neurons in your brain as one big family which has but one goal – to keep you alive, to make you happy, to ensure good communications with your friends and family. You can see on the screen how one of the member of this family looks! Can you try to draw it? (Help the students complete their draw a neuron exercise.)	8 min
5, 6 , 7	Afferent and Efferent Neural connections	Remember that neurons <i>a/ways</i> work together. No single neuron is able to do anything without the help of his fellow neurons. The connections between neurons are called “synapses”. They look like two neurons holding something like “hands”, although they are not really hands! Each neuron has parts, called “dendrites” and “axon”. A neuron uses the dendrites to connect to the previous neuron and uses the axon to connect to the next neuron. How neurons work together is actually quite complicated but you will learn about that later in your education! The important thing now is to imagine a great number of connected neurons in your body. There are two very important kinds of connections. One of them starts from the organs with which you perceive the world – eyes, ears, skin, etc. This kind of connections bring information from the outside world into your brain. The other kind of connections start within your brain and carry information to your muscles so that you can move and speak. Scientists call the first kind of connections “afferent”, and the second kind – “efferent”. The neurons which make up the afferent connections are called “sensory” neurons, while the neurons which make up the efferent connections are called “motor” neurons. Think of them as neurons which let you know about the world and as neurons which let you act on the world!	10 min

8	Putting Yourself in Someone else's Shoes (Activity)	A great deal of your life depends on a very important skill – to be able to put yourself in someone else's shoes. This skill is often called "empathy". Empathy makes it possible for us to understand others, and because of this to communicate with them, but, perhaps most importantly, to learn from them. (Give the students some examples about empathy, stressing out that understanding is necessary for them to communicate and learn from others. Then hand the students their "Putting Yourself in Someone else's Shoes" exercise and assist them with its completion.)	10 min
9, 10	Behind the skill – Mirror Neurons	As with every skill you have, it is actually your brain that makes empathy possible. More precisely, your feeling that you understand someone as well as your actions towards her are thanks to the great big family of neurons which works within your brain all the time. Sometime ago (more than three decades) Italian scientists made an interesting discovery while investigating Macaque monkeys (see Fogassi and Gallese 2002:14-15). When a monkey grasped something in its hand, certain neurons in the left temporal part of the brain (see slide 9) started to work. Then, when the monkey observed another monkey or a scientist grasping the same thing (a peanut, for instance), the same neurons started to work. Then similar discoveries were made with humans as well (see Rizzolatti, Craighero, and Fadiga 2002). Basically, this means that in many cases your neurons in the left temporal part of your brain do almost the same thing when you do something and when you see someone else doing the same thing. Scientists believe that these neurons are very important for our empathy skill (see Keysers and Gazzola 2009:13-14). They make our experience similar to the experience of the person we look at. That's why scientists labeled these neurons "mirror neurons" – as if they reflected the emotions, intentions, and the knowledge of the person we observe with our eyes. Just like a mirror. Unlike other neurons in our brains, great numbers of which are either sensory or motor, mirror neurons are believed to be <i>both</i> sensory <i>and</i> motor. That is, mirror neurons both tell us about the actions of other people and let us know how can we act in the world!	10 min
11	Mirror, mirror (Video)	(Watch the "Mirror, mirror" video)	2 min

11	The Mirroring Game (Activity)	Time to play a game! (Divide the pupils into pairs. First, a pupil should do a series of actions of her/his choice, though you would do well to offer advice. The other pupil must then do the same actions as "close to the original" as possible. Then let the pupils swap their roles. After the game, explain to them that mirror neurons explain our ability to mimic actions successfully. However, add that scientists are not certain about many details on mirror neurons and that they are still investigating them.)	16 min
12	Review and Evaluation Assessments	What have we learned today? What is a neuron? How were mirror neurons discovered? What is empathy and is it connected somehow to our brain?	2 min
		TOTAL LESSON TIME	1 HR

Power point Example

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ARE YOU READY TO TALK ABOUT ...

- **WHAT IS THE STRUCTURE OF OUR BRAIN AND ITS FEATURES ?**
- **WHAT HAPPENS IN OUR HEADS WHEN WE COMMUNICATE WITH OTHERS ?**
- **HOW EXACTLY THE BRAIN WORKS ?**

KINDS OF NEURAL CONNECTIONS

AFFERENT CONNECTIONS...

- ...start from our sense organs (eyes, ears, etc.) and take information to our brain.
- These connections are made by the sensory neurons which provide us with knowledge.



This smells like my favorite soup!

EFFERENT CONNECTIONS...

- ...start from our brain and take information to our muscles.
- These connections are made by the motor neurons which let us act on the world.



Come on hands!
Let's eat this soup!

TO PUT YOURSELF IN SOMEONE ELSE`S SHOES...



...is a valuable skill called “empathy”. It permits us to understand others` feelings and emotions. This helps us learn a great deal about our own inner world!

Teachers Evaluation and Handouts

NEUROHEADWAY

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Teacher Evaluation Assessments - SOCIAL NEUROSCIENCE

1. How challenged by the work did the pupils appear to be?
2. Did pupils ask any questions?
3. Were those questions covered in the materials?
4. Did the pupils cope with the tasks in the activities?
5. Did any of the students lose interest at any point?
6. Which point do you think the lessons are age relevant?
7. Was the information presented in the lesson interesting for the students?
8. Would the Teacher like more Animation / more Activities introduced?
9. Key Metrics, for Teachers to monitor in each child, over a set number of weeks
 - Growth Mind-set
 - Perseverance
 - Empathy

- Social Abilities
- Imagination
- Participating in Class
- Working Hard
- Helping Others
- Leadership
- Grit

10. During the lesson, did you notice any particular student to have a hard time understanding some of the notions, concepts and examples in the materials?

Empathise with Others

Divide into groups constituting of maximum five pupils. Your task is to find a group of people or a cause that you empathise with and try to help in some way or another. For example, if you choose an orphanage, you can make a play or draw something for the children there. The purpose of this task is to show your support. Your teacher can assist you with ideas on how you can help! You have four weeks to finish your project.

Putting Yourself in Someone Else`s Shoes

In the exercise below you will be acquainted with Sarah`s story. Use your imagination and put yourself in her place. Then try to write down what she is experiencing.

Can you put yourself in Sarah`s shoes?

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