Notes for teachers

At a glance

Impulsive, socially anxious, uncompromising - these are some of the characteristics you may recognise in the teenagers you know. Scientists at the University of Oxford are researching into changes that take place in the teenage brain that may explain this change in behaviour.

In this activity students use various models to explain the brain, including playing a game to model the neural strengthening and pruning process that takes place in the brain during adolescence.

It is best used as an extension activity after students have learnt about nervous transmission and synapses.

Learning Outcomes

- Students use models to represent processes in the brain
- Students discuss why models are used in science
- Students learn how the brain changes from birth to adulthood

Each group of students will need

- Copy of student worksheet page 1
- Copy of student worksheet page 2 (the game board)
- Cards cut from student worksheet pages 3-6
- An answer sheet cut from student worksheet page 7
- A stopclock

http://www.oxfordsparks.ox.ac.uk/content/brain-development-teenagers
Possible Lesson Activities

1. Starter activity
   - Tell the class that they are going to model what happens in the brain. Ask them to stand up and spread each of their arms wide so they are each touching the arm or shoulder of another person. Tell one student to move one of their arms to gently nudge one person. As soon as they feel the movement they should move their other arm. The movement should pass around the class.
   - Question the students to explain how the model represented what happens in the brain and its limitations:
     - What did each person represent? (nerve cells/neurones)
     - What did the whole class represent? (a neural pathway in the brain)
     - What was the movement they passed on? (an electrical impulse)
     - Was there anything that wasn’t represented well? (the speed was much slower than in real life, the synapses in between neurones were not represented).
   - Tell the class that they are now going to focus on how the brain changes from birth until adulthood. Play the animation ‘Brain Development in Teenagers’. Ask students to watch out for any models the animators used. After watching, discuss the models used: the fairground to represent the brain, the different rides to represent the regions in the brain, how some of the rides stopped working to show neural pathways that have been pruned and some were added or modified to show neural strengthening. Talk about why the animators used these models, did they help to explain the science?
   - Sort the class into groups of 3. Give each group a copy of page 1 of the student worksheet and ask them to read through it.
   - Discuss the information as a class, encouraging students to ask any questions of things they don’t understand or want to discuss further. Make sure students understand what is meant by neural strengthening and pruning.

2. Main activity: Playing the Brain Game
   - Give each group of students a copy of the game board (page 2 of the student worksheet), a stopwatch, game cards (cut from pages 3-6) and an answer sheet (cut from page 7). One of the cards is the rules, which they need to read through.
   - Show them that the game board models a brain, and the neural pathways within it.
   - The groups play the game. They will be answering questions that are loosely based on the skills that involve different parts of the brain (as seen on the diagram on page 1 of the student worksheet). As they play they can discuss which types of questions they each find easy and which they find challenging.

3. Plenary
   - Discuss with the class how the game models what happens in the teenage brain. During the game they modelled strengthening neural pathways by colouring them in. Different activities strengthen certain pathways in the brain.
   - At the end of the game they will have some pathways that were not coloured. These are lost by neural pruning.

http://www.oxfordsparks.ox.ac.uk/content/brain-development-teenagers
Highlight how this process in the teenage brain provides amazing opportunities to strengthen interests and skills.

Weblinks

http://www.oxfordsparks.ox.ac.uk/content/brain-development-teenagers
Brain Development in Teenagers animation

Further information on changes in the teenage brain