Key Stage 4 – MRI

Watching the brain at work

Notes for teachers

At a glance

This activity introduces students to an exciting technique at the forefront of brain research, functional magnetic resonance imaging, or fMRI. Researchers use this powerful imaging technique to pinpoint precisely which areas of the brain are associated with different activities.

The activity guides students in planning an investigation using fMRI and helps them to recruit and instruct volunteers for their hypothetical study.

The activity is best used to reinforce and extend understanding of the brain as a co-ordination centre, as well as to explore the role of technology in investigating the brain.

Learning Outcomes

- Students develop their understanding of the brain as a co-ordination centre.
- Students will have explored the role of a relatively new technology – fMRI – in investigating the brain.

Each student or pair of students will need

- Pupil worksheet;
- Help sheet 2;
- Help sheets 1 and 3 (optional).

www.oxfordsparks.net/mri
Possible Lesson Activities

1. Starter activity
   - Show the animation ‘A spin around the brain’ to the class.
   - Repeat the viewing, focusing on the section from 0:44 to 1:25, which explains how fMRI works. You might need to remind students that protons are tiny positively-charged particles in atoms.
   - Finally, focus on the section from 1:26 to 1:46, which shows the areas of the brain associated with different activities such as listening to music and watching a film.

2. Main activity
   - **This stage is vital!**
     Display the PowerPoint slides. These reinforce how fMRI works and describe experiments using fMRI. Notes are included below the slides. The key points to reiterate are as follows:
     - An fMRI scanner detects changing blood oxygen levels in different brain areas. Areas with higher oxygen levels are more active.
     - The scanner records changes in signals at many different places in the brain. These must then be analysed statistically.
   - Distribute the worksheet to individuals or pairs. Students start by reading the background information and discussing the question in this section. They then work through the different stages of the task – designing an experiment, recruiting volunteers and writing a script to brief volunteers before entering the scanner. Each stage is supported by an optional Help sheet, although all students will need access to the safety information on Help sheet 2.
     Suitable investigation topics include: which areas of the brain are involved in listening to music / wiggling a finger / watching a film / singing? Students must remember that the activity must be something the volunteer can do in a scanner.
   - Higher attaining students may then tackle the extension task, given on the worksheet.

3. Plenary
   - Ask each student or pair to discuss their experiment with another student or pair. Would the other student / pair volunteer for the study? Why? What improvements can they suggest?