

Problem based learning - ADHD

Introduction

This is a problem based learning activity. Students will work in groups to understand the scenario and the questions that need answering in order to plan a response. They will need to explore their understanding of the neurotransmitter dopamine and to apply a range of ideas about how science works, learned at AS, to more complex information. These ideas include the balance of risks and benefits of different treatments and the social influences on the different scientific explanations for ADHD. You may wish to look at the introduction to [problem based learning](#) in the Teaching and Learning section.

How Science Works

Cd Scientists test an explanation by seeing if specific predictions based upon it are in agreement with data from observation or from an experiment (a deliberate intervention to generate data). If data agree with predictions that are very novel or unexpected, this is particularly influential. The aim is to rule out alternative explanations, and so reach a single explanation that most scientists can agree about.

Ce Scientists are more confident about theories that include a plausible mechanism for causing the events observed. It is also important that a new theory is consistent with existing theories that are well-established and generally accepted.

Eb Findings reported by an individual scientist or research group, and their interpretations of these, are carefully checked by the scientific community before they are accepted as reliable scientific knowledge. This process of 'peer review' is essential both for detecting invalid claims and adding weight to valid ones.

Ef In situations where scientific explanations are contested and different conclusions can legitimately be drawn from the available data, the personal background and interests of scientists (e.g. their education, past experience, previous areas of work, political and/or religious views, the interests of organisations they work for) may influence their judgments.

Fc Media reports of scientific developments are always simplified, and sometimes inaccurate. A newspaper report of a new development has not been through the stringent peer review process that articles in scientific journals must undergo (though it may be reporting on work that has).

Fd In assessing how much trust to place in a reported scientific claim, it is important to assess the extent to which it has been subjected to peer review. It may also be reasonable to take account of the seniority, reputation, and place of work of the principal scientists involved.

Hf Decision makers are influenced by the mass media, by special interest groups and by public opinion as well as by expert evidence. Decisions about science and technology may be influenced by decision makers' prior beliefs or vested interests, which can affect their interpretation and evaluation of the evidence.

Hj Some decisions involve balancing the rights of certain individuals and groups against those of others.

Science explanations

Je Dopamine is involved, amongst other functions, in the transmission of signals related to movement and emotional responses.

Jh Most drugs that influence brain function work by changing levels of neurotransmitters. Two of the ways they may do this are by mimicking neurotransmitters or by affecting their reuptake at synapses. For example; nicotine mimics acetylcholine, anti-depressants inhibit serotonin uptake. All drugs (medical and recreational) that affect the brain have some undesirable side-effects.

The activity - Guidance on how to organise each stage of the students' work

Remember that there may be students with ADHD in your class. Think about how you will handle this.

The process involves **6 stages** over **2/3** hours in class if research is done as independent study. The six stages are provided as guidance to PBL but some require less time than others. We suggest that stage 1 and stage 4 are the ones to spend most time on in class.

Stage 1 Question writing - in groups

In this stage you have to make sure that you understand the problem. Talk it through with others in your group, accept all ideas and note them down. Then begin to focus on the questions that you will need to answer before you can give advice. Remember that the explanations you will need to use may be at several different levels ranging from brain chemicals up to social factors.

Try to reach agreement in the group on a set of questions. At the end of this stage, discuss your questions with your teacher.

Some groups have found this stage difficult. As this is the first PBL activity that many students will have attempted you might decide to support them by providing the list of 5 headings for their questions: diagnosis, causes, treatments, decision making and educational context. Your role will be to support the groups' work encouraging debate, checking that they have considered the different aspects of the problem and asking them about their plans for the research. Make sure that everyone in the group is involved and that they are keeping a record of the discussion.

Each group should consider most of the following 5 aspects of the problem and come up with some of the questions below.

Diagnosis

- What are the symptoms of ADHD and how is it diagnosed?
- How reliable is the diagnosis?
- How can you distinguish between normal boisterous behaviour and ADHD?
- Is there a stigma attached to a diagnosis of ADHD?
- Should a diagnosis be confidential?
- Are too many children being diagnosed with ADHD?
- Is it getting more common?

Causes

- What are the causes of ADHD? Are the causes biological, psychological or social?
- Is it caused by poor parenting?
- Is it equally common in boys and girls?
- What changes in brain chemicals occur?
- Do brain scans show any differences?
- Is it inherited?

Treatments

- What drug treatments are there for ADHD?
- How do the drugs work?
- What side effects do drugs have?
- What other non-drug treatments are available ?
- Which type of treatment seems more effective?
- Which type of treatment is cheaper?

Decision making

- Is it right to give children mind altering drugs for conditions such as ADHD?
- Who should provide guidelines about how to diagnose and treat ADHD?
- Who should have the final decision about a child taking drugs to treat ADHD?
- Who does make the final decision now about a child taking drugs to treat ADHD?
- Do doctors have a vested interest in prescribing drugs?
- What is the role of drug companies in promoting ADHD treatments?
- How is it possible to balance the rights of the child with ADHD with the rights of others in the class.

Context

- Do children with ADHD perform poorly in examinations?
- Are there advantages to having ADHD?
- Should schools have the right to refuse to admit pupils diagnosed with disabilities such as ADHD?
- Should a school be willing to change a pupil's teaching group if the pupil and/or parents request it?

Stage 2 Resources - Class work in groups

Plan how you will research answers to your questions and share out the questions amongst the members of your group. In this stage you find the resources you need to answer your questions.

This stage is a link between stages 1 and 3 and need not take much time. You might wish to reduce research time by having some of the key resources, or just the web link, printed to hand out to a group if they ask the appropriate question. Before the end of the class it is important that everyone is clear what they need to do. Teacher support at this stage will be important, ensuring that each member of the group has a clearly defined and manageable role.

Stage 3 Answering the questions – private study

Work on the questions or questions you have agreed to investigate. Some of the resources are provided for you. You may need to find one or two other sources to answer the questions. You may also find that you need to modify your questions as you learn more about the problem.

Stage 4 Response to the problem - in groups

Share your findings from stage 3 with the others in your group. Discuss the answers to each of the questions. Put all the information together to produce a coherent argument that can help others understand the problem in the science class.

Students will need a lot of support at this stage to ensure that real discussion takes place so that they reach a conclusion that is supported by evidence. The group will need to make sure that everyone's contribution is included.

Stage 5 The product – Class work in groups

Writing the final report or presentation

This is a continuation of stage 4 but has been presented separately to emphasise the importance of stage 4. The object is not just to accumulate information but develop a coherent argument.

Stage 6 Whole class discussion/ group work - Evaluation of the process

Issues that should be discussed include:

The way the groups worked

- did everyone contribute?
- did you/ should you have a chair to manage discussion?

Writing the questions

- did you know enough to write good questions?
- were the questions useful in guiding the research?
- how would you plan question writing differently next time?

Doing the research

- did the questions help you focus the research?
- was it easy to find what you needed without wasting too much time?

The response

- did you find it easy to integrate everyone's work into the final report?
- were you able to reduce all the information to a short clear argument?

The overall process

- what did you learn about ADHD?
- did you find this way of working interesting?
- did you find this way of working a good way of learning?

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Introduction

This is a problem based learning activity. You are given a scenario representing a problem. You have to decide what you need to know and understand to deal with this problem. You then, as a group, take responsibility for your own learning. Your teacher will explain the approach.

Scenario

A new term has started and Year 10 has been allocated into sets for Science teaching. The GCSE course has started and there is a meeting between parents and staff to discuss progress.

Jane's parents are very unhappy as a boy called Tom, in her Science set, continually disrupts the lessons, asking silly questions, interrupting the teacher and not concentrating on his work. They think his behaviour in practical classes could be dangerous. They have overheard other parents discussing whether Tom has ADHD. Jane's parents ask that she should be moved to a different set or that Tom should be taught separately, as he is affecting the progress of the group. Jane's parents are concerned that Jane will not fulfil her potential in GCSE Science.

Tom's parents do not seem very concerned about his behaviour and think that he is being picked on because he is a bit of an extrovert. He is quite able and they think he will soon settle down and all will be well. His father says his behaviour was very similar at that age but his teachers were much stricter. They are critical of his teacher for not having better control. Tom's parents have been told about a possible diagnosis of ADHD by Tom's English teacher, but they are sceptical about giving his behaviour a label, and the possibility that pressure would be put on him to have treatment such as Ritalin. They think drug treatment is unnecessary and could have side effects. They think that ADHD is over-diagnosed by doctors with a vested interest in prescribing drugs. They point out that there are several other boys in the class who are also rather hyperactive, and seem no better than Tom. They don't think that Tom should be picked out as the culprit for any lack of progress by the set.

The Task

Your task is to find out more about the issues raised by this scenario so that you would be able to give advice.

The process

The process involves **6 stages** as outlined below. Of these, stages 1 and 4 are the important ones in your group work.

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In this stage you have to make sure that you understand the problem. Talk it through with others in your group, accept all ideas and note them down. Then begin to focus on the questions that you will need to answer before you can give advice. Remember that the explanations you will need to use may be at several different levels ranging from brain chemicals up to social factors.

Try to reach agreement in the group on a set of questions. At the end of this stage, discuss your questions with your teacher.

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Stage 3 Answering the questions – private study

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Stage 4 Response to the problem - in groups

Share your findings from stage 3 with the others in your group. Discuss the answers to each of the questions. Put all the information together to produce a coherent argument that can help others understand the problem in the science class.

Stage 5 The product – in groups

Write a final report or produce a presentation setting out your advice.

Stage 6 Whole class discussion

Discuss the process you have been through with your teacher and the rest of the class.

References

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<http://www.bbc.co.uk/health/conditions/hyperactivity1.shtml>

Royal college of Psychiatrists - Factsheet 6: Stimulant medication for hyperkinetic disorder and attention-deficit hyperactivity disorder: for parents and teachers

<http://www.rcpsych.ac.uk/mentalhealthinformation/mentalhealthandgrowingup.aspx>

MIND - Understanding ADHD

<http://www.mind.org.uk/Information/Booklets/Understanding/Understanding+ADHD.htm>

ADHD advice secretly paid for by drugs companies

<http://www.telegraph.co.uk/news/uknews/1500215/ADHD-advice-secretly-paid-for-by-drugs-companies.html>

ADHD information services

<http://www.addiss.co.uk/index.html>

NICE - Final Appraisal Determination - Attention deficit hyperactivity disorder - methylphenidate, atomoxetine and dexamfetamine (review)

<http://guidance.nice.org.uk/page.aspx?o=260402>

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