TWENTY FIRST CENTURY SCIENCE

DEALING WITH CONTROVERSIAL ISSUES

Discussion of controversial issues features in the OCR specification for the GCSE Science course. Guidance is given for each particular activity in the OUP Teacher & Technician packs, particularly for GSCE Science.

This document provides general guidance for use in departmental INSET or other CPD.

Objectives

- Awareness of the potential of controversy as a teaching resource
- Anticipating problems of polarised viewpoints and ways of addressing them
- Gaining confidence in the teacher's role in discussion.

Purpose

Controversial issues draw students into thinking about a scientific issue or concept – controversy invites consideration of new facts and opinions, which may influence students' thinking.

Science provides a good base for thinking about controversial issues in two ways. First, developments in science and technology raise contentious social, ethical, and legal issues. Examples are nuclear power, cloning, and environmental concerns. Secondly, differences arise within the practice of science. There may be disagreement about the way data should be interpreted, or the validity of a new theory.

Controversy arises in the public domain when:

- Substantial sections of the population disagree over an issue.
- Both sides draw on good reasons to support their positions.
- Value judgements prevent the differences being resolved by evidence alone.

This definition of controversy may be in itself controversial, but it will suffice for most cases.

Problems

Although discussion of a controversial issue can be stimulating and thought-provoking; it also generates problems. Do not be surprised if students are not initially excited by the prospect of discussing something controversial. Students sometimes do not see discussion of

controversial issues as 'real science', and it may take them time to become accustomed to this way of working in science.

There is always the danger of bias when discussing a controversial issue. This is not always a bad thing – for some topics there are so many points of view that it is impossible to represent every perspective. Nonetheless, different viewpoints and the evidence supporting them should be considered.

Students may have very strong feelings about an issue such as abortion or animal rights. This can result in hectoring and refusal to listen to alternative arguments. Students may come from families with strong views, and questioning a firmly held position may be considered an insult to family members. Sensitivity is needed. Seek advice from experienced teachers who have dealt with these issues before.

Framing the discussion

Some aspects of scientific controversies may involve ideas where certain viewpoints are deemed offensive, for instance discussions about race. Controversy involves values. Frame the discussion in the context of respect for one other, acting in the interests of everybody, and listening properly. Remarks which cause offence to people are prohibited. Anyone who infringes the rules will be excluded from the discussion and the reason made explicit. If students espouse antisocial viewpoints because their parents hold them, do not excuse the comment on these grounds – follow it up sensitively with the student individually later on.

The teacher's role

Dealing with controversial issues can place the teacher in a difficult position. Students may want to find out what the teacher's position is. There may be consequences if a teacher makes their position clear. Students may feel restrained from giving a counter-position, or they may feel offended by what the teacher has to say. But taking a neutral stance may give the impression that the teacher has no thoughts of their own. Or students may feel that this is a dishonest stance and probe the teacher all the more.

Sometimes teachers tackle this problem by acting as a devil's advocate to stimulate discussion. In this case teachers should make it clear that they are taking a contrary position deliberately, and that this does not necessarily represent their own opinion.

Thinking ahead

Given the feelings that can be aroused by controversial issues, it is a good idea to prepare students so that they are accustomed to discussing differences. For example, if students are aware that data and its interpretation are tentative and uncertain, and that a lot of work needs to

be done to establish a concept or generally held idea, then it becomes more acceptable for students to probe grey areas and not necessarily opt for one camp or another.

The study of some of the main ideas in science, and interpreting classroom data, can help to establish that not all scientific facts are certain.

Opportunities for discussion

Opportunities arise in areas such as the theory of evolution, the Earth-centred versus Sun-centred universe, the oxygen theory of combustion versus the phlogiston theory, and Pasteur's challenge to the theory of the spontaneous generation of life. Students could be given simplified readings supporting contending positions and asked to pick out the facts which support each position, and why. Illustrative experiments could be done where possible. An example, in the oxygen theory of combustion would be an experiment showing that a material does gain mass when it burns. Readily available data in modern medicine is another good way to look at the nature of evidence.

An example of looking at the nature of evidence is Activity sheet AC1.24 'What caused the extra deaths?' in module C1 'Air quality'. In this activity, students consider different pieces of evidence to explain a peak in asthma hospital admissions.

Examining data from experiments will also show students that theory is needed to help draw conclusions, and that there is always a chance that data can be interpreted in different ways. If students have an opportunity to engage in this kind of activity, then they will gradually become aware of the tentative nature of contemporary science. This will make them more circumspect about forming hasty conclusions in other areas.

Frameworks for thinking about issues

Many of the issues arising from scientific and technological developments involve consideration of ethical, moral, legal, and often political aspects. Small group discussion is a helpful way to organise this in its early stages.

Quotations from the OCR specification

The OCR *GCSE Science* specification states in Appendix F 'Ideas about Science':

6 Making decisions about science and technology

In a particular context, [candidates] can identify the groups affected and the main benefits and costs of a course of action for each group.

[Candidates] can distinguish questions which could be addressed using a scientific approach, from questions which could not.

In a particular context, [candidates] can identify, and develop, arguments based on the ideas that:
• the right decision is the one which leads to the best outcome for the majority of people involved
• certain actions are never justified because they are unnatural or wrong.

[Higher tier only] In a particular context, [candidates] can distinguish what can be done (technical feasibility), from what should be done (values). [Candidates] can explain why different courses of action may be taken in different social and economic contexts.

You can download the OCR specification here
http://www.gcse-science.com/teachers_subpage.php?cat_id=198

Students can consider such questions as:
• What facts support this position?
• If there are not sufficient facts, what do I still need to find out?
• What could be possible objections to my position?
• Are the intentions behind this position good, bad, or indifferent? How could I find out?
• Are the actual consequences good or bad? How would I tell?

Organising the discussion

When framing a controversial issue, ensure that the dilemma is focused and, if possible, that students can relate it to their own personal lives. Although students may want to have a vote on a decision, it should be pointed out that a majority decision is not necessarily right or wrong. We are all reluctant to change our minds, even in the face of persuasive evidence, and that needs time. At the beginning of consideration of a dilemma, a line can be drawn across the class from 'strong agreement' to 'strong disagreement', and students asked to position themselves. After the topic has been discussed students can position themselves again, with some students explaining why they have or have not moved.

Controversy can touch unknown sensitivities in students and there may be questions they want to ask but feel ashamed of asking in front of the whole class. The 'message box' method can solve this problem. The teacher has a box in which students can post anonymous questions on slips of paper. At a later time the teacher can answer any questions generally without causing embarrassment to a particular student.

Before a lesson, anticipate the kinds of questions that may arise, so you can address them confidently (this does not mean saying they are right or wrong). Again, where appropriate talk this through with teachers who have handled this kind of discussion before.

Finally, teachers can run a discussion without feeling under pressure from a class that is trying to find out their point of view. One way is to

be pragmatic, so that when proposing a point of view students have not considered, the teacher might say that there are some different possible viewpoints she would like to share with the class. This deflects focus away from the teacher's own viewpoint. The tone of voice and timing are crucial for this strategy, and should suggest a possibly helpful addition to an interesting discussion.

Evaluation

Were students able to give reasons for their viewpoints despite differences?

Did students make progress towards the learning outcomes assessed by OCR (see above)?

Did any students appear to be excluded by the nature of the controversy?

Did the teacher feel confident in handling the discussion without compromising her viewpoint?

Further reading

Ralph Levinson 'Teaching bioethics to young people' in Levinson, R. and Reiss, M. (eds) Key Issues in Bioethics, London: RoutledgeFalmer, 2003

Teachers' notes for Year 9, Unit 10 'Dilemmas' in *The Non-fiction book* published by English and Media Centre, 2001