



Teaching Controversial Issues

Justin Dillon



Teaching controversial issues (Mon 13 Oct, 7-8pm) with Prof Justin Dillon

Justin Dillon is professor of science and environmental education and Head of the Science and Technology Education Group at King's College London. Join this webinar launch followed by a discussion on twitter (just use hashtag [#ASEchat](#)) that will talk about the research and suggest classroom activities.



Teaching Evolution (Tue 14 Oct, 7-8pm) with James Williams

James is a Lecturer in Education at the University of Sussex and former Head of Science. He often speaks about evolution and the curriculum. In this webinar, we'll be discussing overcoming common misconceptions and controversy in teaching evolution.



Teaching controversial issues at Primary level (Wed 15 Oct, 4-5pm) with Dr Andri Christodoulou

Dr Andri Christodoulou is a lecturer at the Southampton Education School. Her research focuses on the use of argumentation in primary and secondary science education. This webinar for primary practitioners looks at what controversial science issues you might encounter and what activities could help you address these with pupils.

Teaching Climate Change (Thu 16 Oct, 7-8pm) Subject focused discussion with Dr Jenny Byrne and Prof. Marcus Grace



Professor Marcus Grace taught science at comprehensive schools in London. He is now Head of Science Education Research in the Education School at the University of Southampton. Dr. Jenny Byrne is a senior lecturer in education. She has taught science in secondary schools and worked as a science coordinator in primary education. Join them about teaching climate change, the facts and how to approach student's misconceptions.



Teaching controversial issues - International Focus (Fri 17 Oct, 7-8pm) led by international education expert, Dr. Maria Evagorou

A global learning special webinar with Dr. Maria Evagorou. Maria is an Assistant Professor in Science Education at the University of Nicosia, Cyprus. Her research focuses on exploring and enhancing students' argumentation and system thinking skills within science education with the use of technology. Take a wider perspective and learn how educators in other countries address controversial issues in their classrooms.



Preparing Science Educators for Everyday Science

A Comenius project

<http://www.ssieurope.net/home.html>



Partnership:

1. University of Nicosia, Cyprus (coordinator)
2. University of Copenhagen, Denmark
3. Universitat Autònoma de Barcelona, Spain
4. Bogazici University, Turkey
5. Ecole Normale Supérieure de Cachan, France
6. Universitatea din Pitești, Romania
7. King's College London, UK



What is PreSEES?

PreSEES is an EU funded project (Comenius/Life Long Learning), and the main aim of the project is to engage elementary and secondary pre-service teachers in critical discussions of everyday science through socioscientific issues (SSI) and prepare them to teach SSI. The project, coordinated by the University of Nicosia, Cyprus, began in October 2012, and will finish in October 2014.

Teaching controversial issues

1. What is a controversial issue?
2. Why should science teachers teach something that's controversial?
3. How can controversial issues be taught?
4. What support is available for teachers?

What is a controversial issue?

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Or so says Wikipedia

Why should science teachers teach something that's controversial?

Controversial issues are a must in African schools because, without them, African children are not likely to form citizenship dispositions that are vital to the health of their communities. (Asimeng-Boahene 2007, 241)

Education should not attempt to shelter our nation's children from even the harsher controversies of adult life, but should prepare them to deal with such controversies knowledgeably, sensibly, tolerantly and morally. (Advisory Committee on Citizenship 1998, 56)

Aims

The National Curriculum for science aims to ensure that all pupils:

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics
- develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the **uses and implications** of science, today and for the future.

Some extracts from the draft Key Stage 4 curriculum for Science in England

Purpose of study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how key foundational knowledge and concepts can be used to explain what is occurring, predict how things will behave, and analyse causes. This foundational understanding should be consolidated through their appreciation of the specific applications of science in society and the economy.

From the draft Key Stage 4 curriculum for Science in England

Scientific attitudes

- pay attention to objectivity and concern for validity, accuracy, precision and measurement of uncertainty
- understand that scientific methods and theories develop as scientists modify earlier explanations to take account of new evidence and ideas, together with the importance of publishing results and peer review
- understand the power and limitations of science and potential ethical questions and debates
- evaluate risks

From the draft Key Stage 4 curriculum for Science in England

Some research

- Oulton, C., Dillon, J. and Grace, M. (2004). Reconceptualising the teaching of controversial issues, *International Journal of Science Education*, 26(4), 411-423.

Based on:

- Oulton, C., Day, V., Dillon, J. and Grace, M. (2004). Controversial issues – teachers' attitudes and practices in the context of citizenship education, *Oxford Review of Education*, 30(4), 489-507.

Unlocking Controversial Issues Project

- To explore the way in which controversial issues are currently handled in the classroom.
- To provide insights into teachers' views about the teaching of controversial issues.
- To use these insights to provide guidance on what strategy CFE might adopt in order to better support teachers, student teachers and teacher educators so that they in turn might teach these challenging areas of the curriculum more effectively.

The study

- Literature survey, 52 studies/papers;
- Preliminary interviews with 6 teachers;
- Four focus group interviews, two with primary teachers (Hereford and Dudley) and two with secondary teachers (London and Southampton) (n=26);
- Teacher questionnaire: 205 responses (17%);
- Teacher trainer questionnaire, 13 responses.

Findings 1

- The majority of respondents regularly teach controversial issues either weekly or termly.
- Few respondents claim to have been formally trained in the teaching of controversial issues

Findings 2

- The majority of respondents did not consider that they were 'well prepared'.
- Factors that militate against the effective teaching of controversial issues differ depending on the strategy used but included time in the curriculum, pupils' behaviour, teaching resources, teacher knowledge and money.

Findings 3

- Over half think that teachers are discouraged from dealing with the political aspects of controversial issues.
- Teachers disagree over which, if any, topics should be taught in a way that is predicated on pupils adopting a particular attitude or value. For example some teachers supported the notion of maintaining balance when dealing with a topic such as race.

Recommendations

- Accept that balance is almost impossible to achieve in our teaching but acknowledge this by making pupils aware of bias in materials.
- Avoid any strategy that encourages pupils to actually make up their minds on an issue. Instead encourage open mindedness and a thirst for more information.

An 'alternative pedagogy'

- Focus on the nature of controversy and controversial issues, i.e. that people disagree; have different worldviews, value and limitations of science, political understanding, power, etc.
- Motivate students to recognise the notion that a person's stance on an issue will be affected by their worldview;
- Emphasise the importance of teachers and learners reflecting critically on their own stance and recognise the need to avoid the prejudice that comes from a lack of critical reflection.

An alternative pedagogy

- Give pupils the skills and abilities to identify bias for themselves, encouraging them to take a critical stance towards claims of neutrality, a lack of bias and claims to offer a balanced view.
- Promote open mindedness, a thirst for more information and more sources of information and a willingness to change one's view as appropriate, and avoid strategies that encourage pupils to actually make up their minds on an issue too hastily
- Motivate teachers, as much as possible, to share their views with pupils and make explicit the way in which they arrive at their own stance on an issue.

Press release

“The traditional approach to leading a discussion on a controversial science subject is for the teacher to take a neutral role. . . . We believe that this strategy is wrong and that it is unethical to pretend to pupils that teachers have no opinion”

British Association conference 2004

Call for new approach to science teaching

Mark Crow, Wednesday September 8, 2004

New research has lambasted science teaching in the UK as 'unethical' for its failure to acknowledge the importance of personal bias. The research, published in latest issue of the Development Education Journal suggests that teachers are using the wrong tactics to teach controversial scientific issues and calls for a more open and transparent approach.

Towards objectivity?

Rosemary Davies, a researcher from *Save British Science*, said that whilst it may be inappropriate for teachers to claim to be dispassionate about controversial science issues, students should still be trained to aspire towards objectivity.

An Australian View

Teachers told to spice up lessons

“A good teacher will engage debate, provide the students with different points of scientific view, get them to question, get them to test and get them to come up with their own solution ... It's kind of irrelevant whether they put their point of view...”

Deborah Crossing, executive director of the Australian Science Teachers' Association

What support is available for
teachers?

<http://www.ssieurope.net/home.html>

Guilty or not guilty

Should we or shouldn't we?

DNA from an unusual source provided crucial evidence for police investigating the murder of a 66-year old widow.

The man who killed the pensioner was caught after advances in DNA technology identified him from a blood sample found at the scene of the crime.

Experts from the Forensic Science Service (FSS) used cutting-edge DNA fingerprinting techniques to obtain a full DNA fingerprint from the tiny DNA sample obtained from the blood – this was not previously possible. When the fingerprint was checked against The National DNA Database it was matched with a man, whose DNA had been taken as a result of a previous offence.

The National DNA Database currently holds 1.5 million DNA fingerprints, some of which are from people who have not been convicted. It is hoped to increase it to 3 million by April 2004 from DNA fingerprint data obtained from people who have either been charged or convicted. Police forces are now expanding its use to track down burglars and car thieves.

Questions



How is a DNA fingerprint produced?

1



Can two people have the same DNA fingerprint and how reliable is DNA fingerprint evidence?

2



Is it legal to keep someone's DNA fingerprint data on a DNA Database when they have not been found guilty of a crime?

3



How much DNA is needed to be collected at a scene of crime to produce a DNA fingerprint?

4

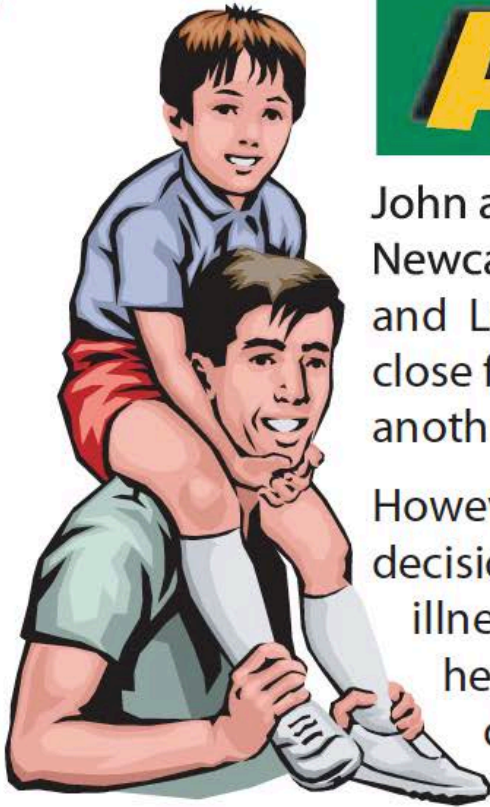
A life for a life?

John and Sarah Robertson, who live in Newcastle, have two children, Ben aged 3 and Lucy aged 6. They are a very happy and close family and are now planning to have another child.

However, the family face a very difficult decision because Ben has a serious illness. He has a disease which means that he has to have painful injections each day, just to keep him alive.

Scientists and doctors have now found a cure for Ben. Using the latest DNA technology, he could be given a transplant of cells from someone matching his 'tissue type'. This would mean that he could be free to live a normal, healthy life.

Should we or shouldn't we?



Questions



Is genetic modification (GM) the only way that scientists can produce these plants?

1



Is it OK to use genetically modified (GM) plants to clean up pollutants?

2



If we use genetically modified (GM) plants to clean up pollutants, will this affect any other living things in the environment?

3



Are there any risks to people?

4

The future

“The focus of recent international comparisons, such as PISA, towards a focus on scientific literacy, might promote the cause of STSE education but it will take a major shift in teacher understanding and pedagogy before schools adequately prepare students for the complexity of life in the 21st Century.” (Dillon, 2011)

Resources

- <http://www.nuffieldbioethics.org/education/education-teaching-resource-biofuels>

Nuffield produced a good resources which contains lesson plans and resources on the topic of BioFuel

- <http://www.sciberbrain.org/>

SciberBrain is an event for year 9 or 10 pupils which address controversial issues with a scientific component.

- <http://www.beep.ac.uk/content/index.php>

Bioethics Education Project

- <http://www.peep.ac.uk/content/622.0.html>

Physics and Ethics Education Project

- <http://www.at-bristol.org.uk/teachingresources.html>

Citizen Science At-Bristol/Debate and discussion guides

References/further reading:

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- Dillon, J. (2009). Approaching soft disasters in the classroom: teaching about controversial issues in science, technology, society and environment education. In, Jones, A. & M. de Vries (Eds), International Handbook on Research and Development in Technology Education. Rotterdam: Sense.
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#ASEChat

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