Girls’ Responses to the Teaching of Socioscientific Issues
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Outline of the focus of the study

A prominent issue in science education research is the declining interest and participation in physical science amongst young people. In England this decline is noticeable in the choices students make in post-16 education, once science is no longer a compulsory subject to study. One approach that has been advocated as a move towards overturning this pattern is the inclusion of socioscientific issues in science lessons (see for example Zeidler, et al., 2005). Socioscientific issues, briefly, are issues where scientific research impacts on society, creating controversy and ethical dilemmas. Examples of such an issue could include the recent developments in genetic technology, climate change or air pollution.

Research in this area has shown positive results for student understanding when this approach is taken in a lesson. Much of this research follows a certain pattern in that researchers design a teaching intervention on a socioscientific issue and then evaluate its effectiveness, usually with regards to student learning (Fowler, Zeidler, & Sadler, 2009; Yager, Lim, & Yager, 2006). However in England a different opportunity has arisen. Following a science curriculum reform in 2006 for students aged 14 – 16, socioscientific issues now have a heightened presence in science lessons. This context provides a highly relevant and authentic opportunity in which to conduct research. Thus this study concentrates on socioscientific issues in the science classroom in the context of a recent curriculum reform. The research questions focus on the form socioscientific issues take in the revised curriculum and how they are enacted in the classroom.

Whilst the problem of participation in post-16 science education is a broad one, there are certain groups of young people who are underrepresented in these science courses. Girls form a group underrepresented specifically in physics courses. This is a widespread concern in academic literature (Murphy & Whitelegg, 2006; Rolin, 2008). In line with this concern a further research question in this study looks at how girls are responding to the teaching of socioscientific issues with the idea that understanding this could contribute towards research in the area of gender and participation rates.
Short Review of Relevant Literature

There is a large body of literature that is concerned with socioscientific issues in the science classroom. A review of this shows some trends appearing. There is a reasonable quantity of research suggesting that socioscientific issues are challenging for science teachers to teach (Bartholomew, et al., 2004). However, there is also a significant amount of writing arguing for the benefits of teaching such issues. Findings from this literature suggest that students can improve their conceptual understanding of science in this way (Sadler, et al., 2007; Yager, et al., 2006) and benefit from the opportunity of a debate (Lewis & Leach, 2006), particularly in a multi-cultural society (Levinson & Turner, 2001).

Turning to literature concerned with gender and socioscientific issues, some small-scale studies show that the inclusion of these in lessons has a positive effect on girls (Hughes, 2000; Sjoberg & Imsen, 1988). Feminist literature also presents the idea that science is masculine (implying that this may be unappealing to girls and women) and that a feminine science would include placing science into a social context (implying that this may be appealing to girls and women) (Barton, 1998; Rosser, 1986). The inclusion of socioscientific issues in science lessons could be, therefore, put forward as an idea that may improve girls’ participation and interest in science. This is however, fraught with a problem in that doing so reinforces gender stereotypes and treats girls as a homogenous group. In the reform which is the focus of this study, socioscientific issues were not introduced to benefit girls. While the literature may view socioscientific issues or placing science in a social context as feminine, this idea is not evident in the rationale for the current curriculum.

Research questions

The aim of this study is to investigate how socioscientific issues are being enacted in the classroom and the impact of such teaching on girls. This has been divided into three main research questions as outlined below:

1. What form do socioscientific issues take in the revised science curriculum?
2. How do the classroom activities used when teaching socioscientific issues and scientific concepts compare?
3. How do girls respond to the teaching of socioscientific issues compared to the teaching of scientific concepts?

Outline of the research design and methods

To answer research question 1, a document analysis of science textbooks is being conducted to find out what form socioscientific issues take in the revised science curriculum. The textbooks included in the analysis will be the ones the participating school uses which are: Burden, et al., (2006) *GCSE Biology* (Oxford: Oxford University Press); Campbell, et al., (2006) *GCSE Physics*, Oxford: Oxford University Press; and Hunt and Grayson (2006) *GCSE Chemistry*, Oxford: Oxford University Press. In the analysis of the textbooks, several aspects will be looked for including the topics socioscientific issues cover, the type of language used and how they are presented (e.g. how many different sides to the argument are given, whether there is a dominant perspective).

Data collection for research questions 2 and 3 will be conducted within one school. Employing such a method means that detailed data can be collected. This method is also in line with the scale of the project. The school approached to be involved in the study was chosen because of the syllabus followed. While all schools follow a common curriculum in England, each school is able to choose a syllabus to teach in their school. The school approached teaches the OCR 21st Century Science syllabus. 21st Century Science was developed and piloted as a new course, involving academics at the University of York and is well known for its strong emphasis on socioscientific issues. Thus choosing a school undertaking this syllabus maximises the chances of seeing this pedagogic challenge ‘in action’, with committed teachers working with a well-developed course in an authentic school setting.

Within the school several classes (of students aged 14 – 15) will be sampled throughout the academic year 2009 – 2010, observing particular sequences of lessons (that include at least one socioscientific issue and one scientific knowledge lesson). Field notes only will be made of the lessons observed through the use of a lesson observation sheet that has been devised and piloted. This sheet allows for space to record the types of activities carried out in lessons and the teacher-student interactions, drawing on the
work of Mortimer and Scott (2003). Two student focus groups will be carried out after each sequence of lessons observed. In these groups, students will be asked for their responses on one scientific concept lesson and socioscientific issue lesson I have observed. Student focus groups will consist of a group of four girls chosen by the class teacher. The criteria teachers are given to select students are that they should be willing to contribute to a discussion, and that the group should include a range of attainment and a range of interest in science. The sequences of lessons and accompanying focus groups will provide data to answer research questions 2 and 3.

**Preliminary Findings**

Data collection of lesson sequences and focus groups is nearing completion in the participating school. One theme beginning to emerge from the focus groups is that some girls enjoy learning something new in science lessons, a new science fact. Most have some knowledge of the socioscientific issue in question and for some students this affects their enjoyment of the lesson as they feel they are not learning anything new. The girls also have their own criteria for judging lessons aside from the character of the content including the types of activities, the teacher, and the classroom environment.

Some work has also been done towards research question one, analysing the textbooks. This analysis has found that in some cases the socioscientific issues covered in the textbook are presented from one perspective. Whilst there may be ‘for and against’ arguments given in the textbooks for particular issues, these arguments tend to derive from a particular perspective, rather than reflecting the range of approaches that might be possible. An example of this can be seen in a section in the biology textbook which covers the issue of genetic technology. This section throughout refers to people who have a genetic condition. In doing so it is referring to disabled people. The only perspective of disability drawn upon in discussing this issue is what is called in the sociological literature the ‘medical model’. This defines disability as resulting from a personal impairment which prevents a person from taking part in everyday activities. An alternative perspective of disability that could have been drawn upon is the ‘social model’, which understands disability as resulting from barriers in society that prevent certain people from taking part in everyday activities. By only using the medical model of disability all for and against arguments can be located within this, and no alternative
ideas (such as the social model perspective) are presented. There is some evidence that these kinds of limited perspectives occur elsewhere within the teaching of socioscientific issues.

**Bibliography**


