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Teacher perceptions of ‘good practice’ and equity in primary technology education

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Abstract
This paper discusses teacher understandings of the nature and relevance of technology and education to society in the context of a critical review of the U.K. literature concerned with ‘values’, and with gender and ‘race’ equality. The paper also presents the findings of a survey, conducted in 1993, of British primary school teachers’ perceptions of what counts as ‘good practice’ in design and technology education. Those areas in which they lack confidence or interest are especially identified. The paper suggests that in order to provide a technology education that is adequate, child-centred equality perspectives should permeate all design and technology contexts and not be marginalised in the limited terms of ‘girl friendly’, ‘intermediate’, multi-cultural or ‘third world’ education.

Apart from the micro-political disputes and struggles that have occurred within British secondary schools, struggles between Home Economics, Craft Design and Technology and Business Studies etc. (Paechter, 1993), the Design and Technology curriculum has been, and is constantly in the process of being, shaped by external influences. David Layton (1992b) has identified the stakeholders that are currently attempting to shape the technology curriculum and he discusses the implications of any failure to recognise the value laden nature of the subject.

Layton’s paper recognised that the imposition of values in technology created ‘winners’ and ‘losers’. This paper takes this argument a step further to consider the systematic process of social, economic and cultural domination of those groups who are currently disenfranchised by dominant technological forms. Women, the disabled, ethnic minorities and the, so called, ‘third world’ cultures can be seen as the most significantly disadvantaged in these terms.

Layton’s arguments come closest to a recognition of such domination in his consideration of gender and his account of research carried out by Carol Gilligan (1982). However, Layton’s work is limited because he finally leaves us with no more than a suggestion that we should; ‘provide opportunities for girls to define technological challenges, and to respond to these, on their own terms’ (p7). Most importantly this ‘girls technology for girls’ perspective neglects the need to educate boys for gender equality. As Anne Riggs (1994) points out: ‘There must be a change in technology education for there is a missing dimension: the perspective of half of the world’s population’.

It is now widely recognised that solutions to the problem of providing equality of opportunity for girls are more likely to be found in anti-discriminatory educational provision for boys (Siraj-Blatchford, I. 1994) Likewise racial prejudice is most significantly a problem for the white majority ethnic group in this country and the solutions to Black underachievement is through ‘education for all’ (DES 1985).

As Hind Makiya and Margaret Rogers (1992) have argued, the national curriculum for design and technology should be relevant to every child, and the subject can contribute significantly to challenging negative stereotypes:

‘Since the design and technology profile component has such a strong emphasis on evaluation (AT4) and identifying and satisfying human needs (AT1), and because value judgments are very strong aspects of both of these areas, it is necessary for teachers to consider how pupils build these value judgments and the factors that influence these. Gender and culture are two of these factors. Culture can also include peer culture, and social and economic cultures apart from historic and geographic factors’ (p13).

What we encounter today is the product of value judgments made in the past, ‘hardened history’ as David Nobel (1979) called it. An essential element of an education in design and technology is some understanding of the range of value options and the reasons for the choices that have been made between them. This should include the choices that have accelerated the technological process in particular parts of the world in previous times and those that are doing so today. The wording of Attainment target 4 of the national curriculum, with its reference to ‘an evaluation of the processes of Design and Technology in other times and cultures’, was intended to ensure attention to this point. It is to be hoped that the 1995 revised national
curriculum emphasis upon ‘products and applications’ will be interpreted in the same way.

Technologies are successful when values are congruent between the designer and the consumer/user, and while this is most typically illustrated by examples of technology transfer between cultures it is equally true between cultures and genders within our societies. To accept Gilligan’s case, as Layton does, that women have a different value system to men, does not have to mean that we develop two technologies. There may well be real problems with some of the dominant male values and technology may have a major role to play in moderating or adapting these.

Much of the above arguments can be applied equally to contexts of disability and to global educational contexts. The disabled are often the victims of exclusively able bodied technological artifacts and environments. Equally we need only look at the case of baby milk to recognise that the poorest of the world are also the victims of inappropriate technologies. According to UNICEF over 4,000 babies die every day in poor countries because they are not breastfed and yet baby milk products are aggressively marketed in these areas.

What is being argued for here is a change of emphasis in educational provision. When the specific needs of gender, ‘race’, economically disadvantaged and disabled groups have been considered in the past the concern has more often been expressed in terms of ‘equality’. An alternative perspective can be identified through considering the values issues, and this is one which is much more in keeping with mainstream liberal educational principles. This perspective emphasises justice and equity and in practice it will involve bringing about changes in the dominant and dominating values rather than those of the victims of unjust cultural and economic domination.

Equality and Equity are complementary concepts (Byrne 1985), yet equity, ‘the quality of being fair and equal’, is set firmly in the context of jurisprudence. Equality, by contrast, is more problematic. In its equality of opportunity form, as an ideological product of Victorian liberalism, it is more meritocratic concept than an egalitarian one (Jeffcoate 1984). In its various forms, equality is a contested concept while equity and justice are fundamental rights of citizenship, arguably these principles are more universally accepted by the teaching profession.

Before returning to these issues and to the problem of developing appropriate strategies for dealing with them in primary schools, something needs to be said about this group of stakeholders that Layton (1992b), surprisingly, fails to consider in his analysis.

The Views of Primary School Teachers

As Layton (1992b) argued, as stakeholders, ‘Sustainable Developers’ have emphasised global responsibility, appropriate technology and alternative technology. They have emphasised the need to empower people with the knowledge, skills and values that are needed to develop appropriate technologies that will provide themselves and future generations, as well as other societies and cultures, with an acceptable quality of life. A distinct ‘womens’ perspective on science and technology has been developed by feminists since the early 1970s and is reflected in a wide range of publications and national and international conferences. Many approaches have emphasised the denial of access to technology and some have taken this further to criticise the nature and practices of technological and scientific enterprise themselves (Harding 1991; 1993).

Clearly practising teachers may subscribe to any of the views identified by Layton, but they are also likely to have other views and priorities that are conditioned by the realities of actually delivering the curriculum in the classroom and workshop. In 1993 a survey carried out in a shire county (Siraj-Blatchford, J. 1994) was designed to determine teachers concerns and their understandings of ‘good practice’ in the national curriculum for design and technology. Following a series of in-depth interviews, a postal questionnaire elicited 51 junior and infant teacher responses. 59% of the respondents taught in infant classrooms, 8 of the respondents were subject co-ordinators and the respondents reported a very high average teaching experience of more than 16 years.

In one of the questions, primary teachers were asked to identify those areas of the technology national curriculum that they felt less confident with. The following table shows the areas that they indicated:

<table>
<thead>
<tr>
<th>Subject</th>
<th>No Problem</th>
<th>Problems</th>
<th>Not Taught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designing</td>
<td>94%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Making</td>
<td>96%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Structures</td>
<td>57%</td>
<td>20%</td>
<td>23%</td>
</tr>
<tr>
<td>Mechanisms</td>
<td>31%</td>
<td>39%</td>
<td>30%</td>
</tr>
<tr>
<td>Food</td>
<td>69%</td>
<td>6%</td>
<td>25%</td>
</tr>
<tr>
<td>Textiles</td>
<td>59%</td>
<td>6%</td>
<td>35%</td>
</tr>
<tr>
<td>CONTROL: Pneumatic</td>
<td>6%</td>
<td>43%</td>
<td>51%</td>
</tr>
<tr>
<td>Electrical</td>
<td>18%</td>
<td>33%</td>
<td>49%</td>
</tr>
<tr>
<td>Computer</td>
<td>41%</td>
<td>27%</td>
<td>32%</td>
</tr>
</tbody>
</table>
Few readers are likely to be surprised by most of these findings although the number of teachers indicating that they were not teaching structures, mechanisms, food and textiles may be considered alarming. The revised 1995 national curriculum orders for control are less demanding than the current Statutory Orders and the findings may therefore be considered of less concern in 'entitlement' terms.

While many of the teachers views of 'good practice' were defined in terms of outcomes rather than in terms of teaching quality, a significant number emphasised the value of pupils responding to 'real needs'; dealing with problems 'drawn from the pupils own experiences'; and involving; 'planning', 'modelling' and; 'prototyping'. Several respondents also referred to the desirability of achieving a high degree of curriculum integration. Questions, adapted from the 'Views on Science and Technology and Society' (VOSTS) inventory form CDN. mc. 4 (Zoller 1991), were also employed.

The primary teachers responses to questions concerned with capital investment in research and development suggested a difficulty in separating the roles of science and technology. However, in contrast to Riggs (1993) secondary science and technology teachers, only 10% of the primary school respondents accepted an 'applied science' definition of technology. 84% of the respondents saw technology as fundamentally a way of solving practical problems. In common with Riggs findings the primary school teachers also recognised that scientific ideas change and they did not subscribe to the myth that science was completely neutral and value free. In fact a significant number of respondents (20%) suggested that disagreements that occur between scientists are often the result of company and governmental influence.

Most chose a compromise response to questions regarding the decision making status of specialist experts vis-a-vis the public and responses to other questions suggested in fact that the teachers held little depth of understanding or awareness of science-technology-society (STS) issues. Few felt that scientists should be held responsible for the potential harm of their discoveries. However, no respondent suggested that scientists and engineers alone should make decisions regarding global food production and distribution. It is to be hoped, and expected given the topic basis of much primary educational practice, that the schism Riggs found between secondary specialist teachers personal beliefs and their professional behaviour may be restricted to the secondary sector. Further research is however needed to determine this.

Conclusions

Research shows that the overwhelming majority of teachers have a clear understanding of the value laden nature of science as well as technology. It is on the basis of such common understandings that curricula should be developed to emphasise the need to provide social justice and equity. For any 'stakeholder' to attempt to do otherwise would be to attempt to impose a curriculum perspective from outside. Such an attempt would almost certainly be doomed to failure. It would also undermine further the professional autonomy of teachers, making them increasingly vulnerable to other less progressive influences. In their emphasis upon national chauvinism and standard English, the revised National Curriculum Orders for History and for English illustrate what is at stake.

Technologies may become obsolete when the values of producers and consumers are non-congruent but they may also be imposed. We need to consider much more seriously the facts of technological domination, Nobel (1979) described how technologies are often regarded as 'irreducible brute facts'. We also need to consider technological imperialism (Budgett-Meakin 1992). As Layton (1992a) has argued, the so called 'green revolution' provides a good example, people sometimes have no free choice of technologies and social relations are thus changed from outside.

Goonatilake (1984) argues that while modern science was first developed from Asian and North African roots the rich intellectual and scientific traditions of the past have been interrupted by 500 years of cultural hegemony. His book aims to contribute towards the reestablishment of creative science in the majority world. Western science and technology, according to Goonatilake, is characterised by exponential growth and epistemological crisis and this, he argues, provides possibilities for the promotion of anew renaissance. The potential value of adopting a variety of cultural viewpoints is identified and different physical science perspectives and themes, are considered.

We are currently seeing a tremendous increase in the popularity of 'alternative' medicine, and majority world cultures have a great deal more to offer. It has only been cultural chauvinism and prejudice that has blinded us to this recognition in the past. The technologically disenfranchised groups of the past have a great deal to offer but their contribution will only be realised through attitudinal change. Ruth Conway and Anne Riggs (1994) provide some very useful strategies for developing such a new awareness. A growing collection of resources are now available including those developed by Thorpe...

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