Technology and the Hidden Curriculum

Dr Stan Owers
24th February 2004

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This presentation is about a conflict between two strands of our culture. On the one hand we are totally dependent on our tool- and technology-culture to function as individuals and as a society. But on the other hand the value judgments of the majority in our society disparages our tool- and technology-culture.

In the context of this conflict, what I have to show may shock, but there should be no surprises since our society has influenced education, and education has influenced society.

But what do I mean by the "hidden curriculum"?

A sub-set of learning experiences outside the statutory curriculum to which every child is exposed.

This sub-set is influenced by society, with much of the responsibility for delivery given to schools.

The list of possible learning outside the curriculum is a long one; it includes our value and belief systems.

Barnes D (1982:169) *Practical Curriculum Study*, Routledge & Kegan Paul, London.
Boronski T (1988:47) *Knowledge: Sociology in Focus Series*, Longman, London.
Lawton D (1975:6)*Class, Culture and the Curriculum*, Routledge & Kegan Paul, London.
Margolis *et al* (2001:6) *The Hidden Curriculum in Higher Education*, Routledge, London.
Pinder R (1987:143) *Why don't teachers teach like they used to?*, Hilary Shipman, London.

2

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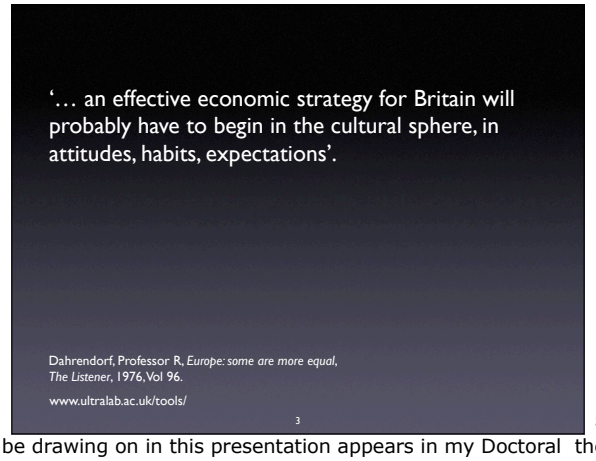
To remain competitive, industry needs to be at the forefront of technological change. However in our society, neither industry nor technology are properly valued, thereby posing an economic threat.

Support for my assertion may be found in Dahrendorf (1976:460) who argued:



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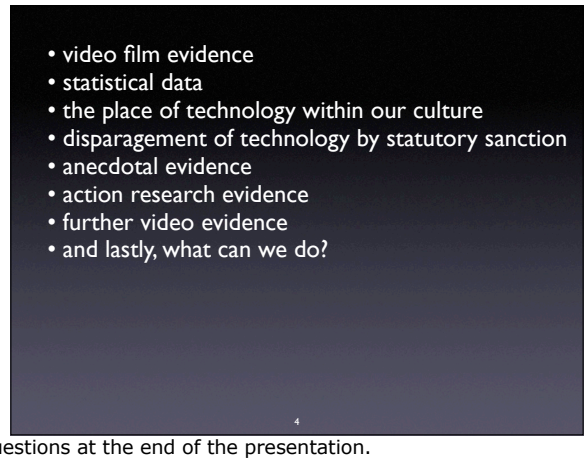
Much of the material I shall be drawing on in this presentation appears in my Doctoral thesis which reports on the place and perception of technology in the National Curriculum, and was printed in 2001. My thesis may be downloaded from:

www.ultralab.ac.uk/tools/

I shall be concentrating on 'the cultural sphere, on our attitudes, our habits, and our expectations'. My account will be historical since the past is in the present.

The presentation will take about an hour, and it is structured in the following way:



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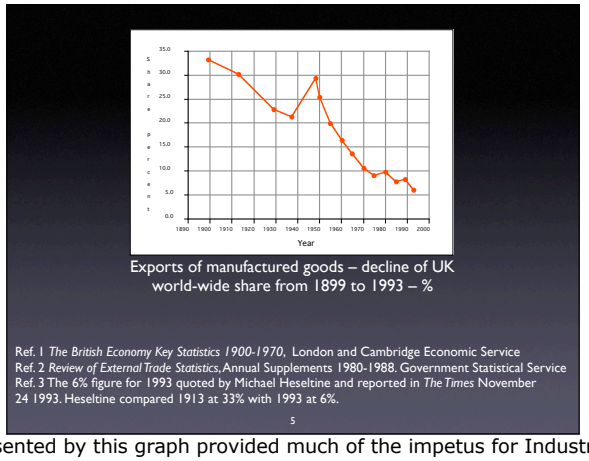
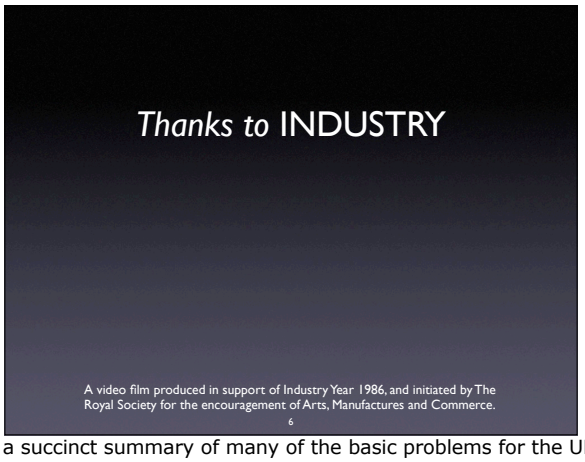
I shall be pleased to take questions at the end of the presentation.

From the first lecture, you may recall that in the early 1970s, I began to ponder why it was we had given the world the Industrial Revolution, and had been in relative industrial decline ever since. I also showed you this graph:



I believe the situation represented by this graph provided much of the impetus for Industry Year *1986*. The short film you are about to see was produced for Industry Year *1986*, and captures many of the issues that should concern us in the cultural sphere, in our attitudes, habits, and our expectations.

This film also serves to show one of the periods in the recent history of our society when we tried to confront a philosophical direction that had always been inappropriate for an industrial and trading society, attitudes that have long been obsolete. See also Rae J, *Our Obsolete Attitudes: Education & the National Malaise, Encounter*, 1977, Vol. 49 pp10-17. Headmaster of Westminster School in London, and former headmaster of Harrow public school.



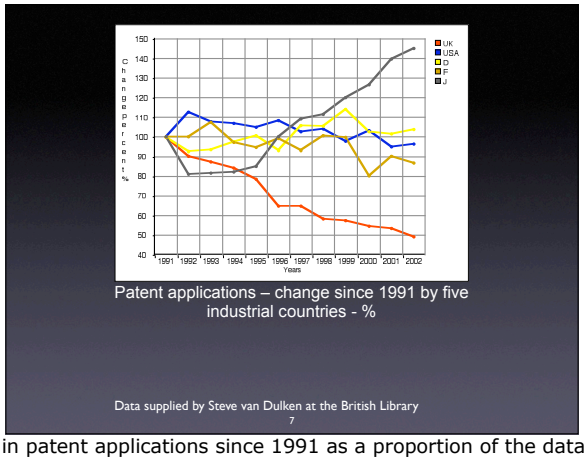
I believe that film presented a succinct summary of many of the basic problems for the UK as an industrial and trading society.

Ignoring industry can hardly be described as an intelligent course of action when we are utterly dependent on the products and services of industry to function as individuals and as a society. We need the wealth creation of industry as well as employment opportunities for a wide range of aptitudes to offer better chances to experience job satisfaction, and a measure of self-esteem. But a further need is for our socio-economic communities to thrive and be prosperous in every part of the country. How else are we going to fund what we demand from the state?

Later in this presentation I shall show you how "snobbery" was exhibited, how snobbery influenced the curriculum, and how those influences are still with us today. Finally, I shall show how those influences were given statutory sanction.

As you saw from the film, the Japanese discovered that the ideas for more than half of the 100 most successful industries started after WW11 came from the UK.

What about our more recent inventive performance?



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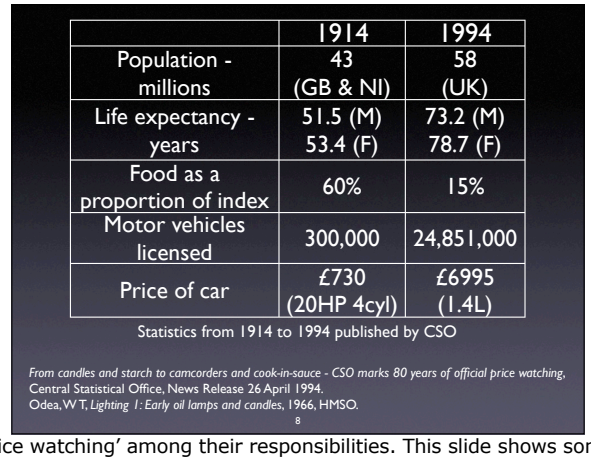
This slide shows the change in patent applications since 1991 as a proportion of the data for 1991. "In 1991 these five countries accounted for 77.75% of all Patent Co-operation Treaty (PCT) filings, while in 2002 they accounted for 74.14% of a much greater total" (22,247 in 1991 and 114,048 in 2002)—van Dulken.

This graph was plotted from data provided by Steve van Dulken of the British Library, which was "prepared for those with an interest in the technological strength of countries".

In my view, this slide portrays a bleak economic future for the UK!

But let me demonstrate how we have benefited from industry and technology in the past by showing you some data published by the Central Statistical Office in 1994.



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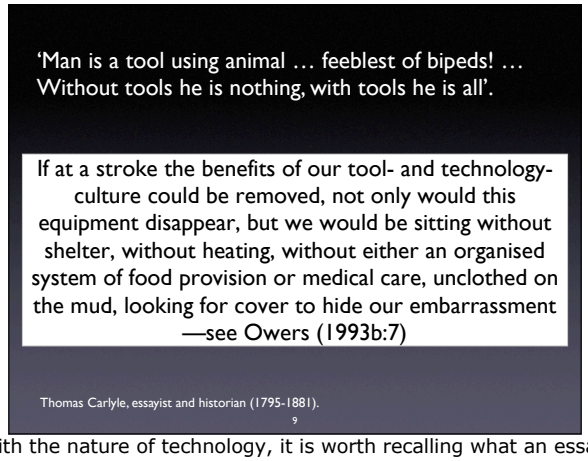
The CSO includes 'official price watching' among their responsibilities. This slide shows some of the data from a survey between 1914 and 1994.

During those 80 years, life expectancy improved for females by 47% and for males by 42%. Contributory factors included the education and training of medical staff, and a greater range of products and services from industry because of new and improving technology.

Changes in the products shown on the index list, reflected the growing affluence of society. In 1914, food as a proportion of the index was 60%; by 1994 it was only 15%. Such changes were only possible because of technology, including increased mechanisation in agriculture, and a wider choice of affordable products from manufacturing industry. The CSO goes on to state: 'The RPI is also a measure of purchasing power. For instance, since 1914 the pound has shrunk in value … to purchase what a pound could buy in 1914, you would now need to spend around £50'.

With no change in technology, a car that cost £730 in 1914 would have cost £36,500 in 1994. How many could afford such prices? With many technological advances, a car was available in 1994 for £6995. The modern car had superior performance and economy, superior ride and handling, superior steering and braking systems, much lower cost of ownership, and was much safer. These CSO data should similarly be a cause for celebration of the achievements of industry and technology, but there were no such references. I believe this is because the functions of industry and technology are difficult to place in a societal perspective.



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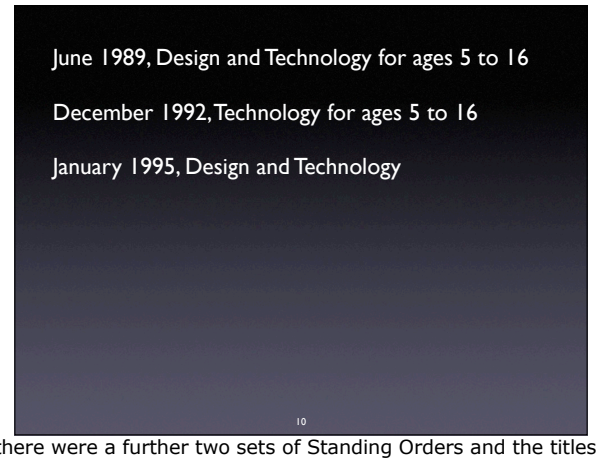
In trying to come to grips with the nature of technology, it is worth recalling what an essayist and historian had to say in the 19th Century.

As a society we live in the made world surrounded by the products of our tool- and technology-culture, and upon which we are totally dependent to function as individuals and as a society. Let me underpin that with this statement.

However D&T was the last subject to be introduced into the curriculum on a national basis when it was authorised by the Education Reform Act of 1988; it came in to effect at Key Stage 3 in 1989.

This late introduction was symptomatic of the inappropriate values that have dogged our society for more than two centuries.

In the context of sustaining itself economically, our society has long been disabled by its value judgments failing to understand the pivotal role of technology in the related wealth creation processes.



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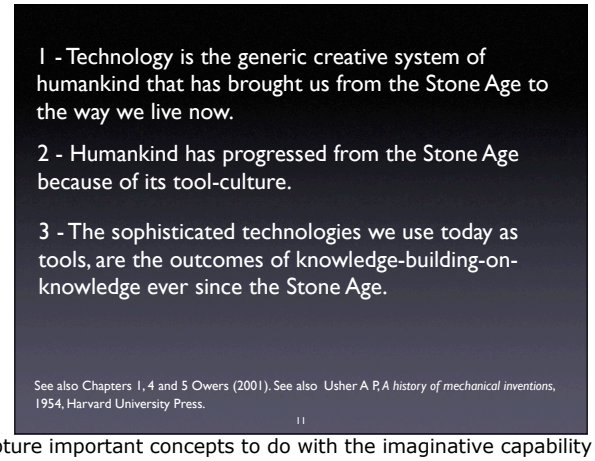
After D&T was introduced, there were a further two sets of Standing Orders and the titles of all three sets are shown here.

- June 1989, Design and Technology for ages 5 to 16
- December 1992, Technology for ages 5 to 16 (1992)
- January 1995, Design and Technology

These 3 sets of standing orders imply considerable difficulty with the introduction of D&T.

The late introduction was made more difficult because technology was not defined in any of the standing orders. If technology can't be defined how can anyone be told what it is, and this surely added to the difficulties faced by teachers.

During the course of my research, I became convinced that defining the place of technology in our lives was of paramount importance, and I would now like to share my findings with you.



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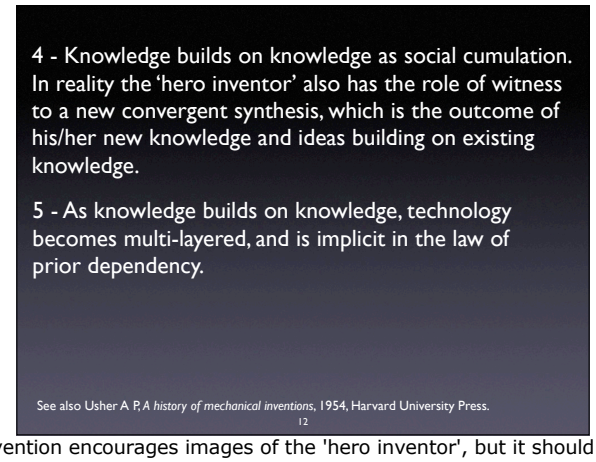
These three statements capture important concepts to do with the imaginative capability of humankind as a toolmaker, a capability possessed by some who could visualise that there was a problem, and go on to find a solution. In the early days finding solutions would sometimes take generations.

Chapter 4 of my thesis reflects on the nature of invention as a key phenomenon in the evolution of humankind since the Stone Age. Accumulation of experience and knowledge is possible in human societies because of their life span—Usher (1954:67) [see Usher A P, *A history of mechanical inventions*, 1954, Harvard University Press]. Ever since the Stone Age, this cumulative acquisition has been a social cultural achievement; the enormity of this cultural process was long overlooked—Usher (1954:68). However, this process yields successions of significant inventions as products, bringing together many specific features of novelty, and many familiar methods—Usher (*ibid*). Here are the next two statements:



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Typically, the process of invention encourages images of the 'hero inventor', but it should be seen also as the product of 'social cumulation'—Usher (1954:68), or knowledge building on knowledge.

I believe the study of 'cause and effect' was a key phenomenon in the evolution of our tool-culture. The study of 'cause and effect' is now a main platform of scientific research, but there is no doubt in my mind that this phenomenon arose first within our tool-culture.

So I regard Science and Maths as knowledge components of technology because it is through technological application that we realise the benefits of research. Here are next two statements:

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The mobile phone provides a good example of one of our tools exhibiting multilayered technology, social cumulation, the law of prior dependency and thus a new convergent synthesis. Starting with the concept of the cutting edge from the Stone Age, our ancestors learned to cut and shape progressively harder materials until steels could be worked and shaped for plastic moulds to produce the phone cases. All this was only possible because of the more recent mastery of precision engineering or technology. Henry Maudslay lived from 1771 to 1831—Rolt (1965:83); he made the breakthrough in precision in his engineering workshops, and in particular for surface plates. Precision surface-plates must be neither convex or concave.

Precision engineering made possible replaceable parts, so providing the foundation for mass-production with huge economies of scale. So Maudslay's contribution can not be too highly regarded, and for me he was the man of the last millennium.

Another crucial concept for the mobile phone was the work of Faraday. In 1821, Michael Faraday (1791-1867) showed that 'a wire connected to a battery would rotate around a fixed magnet'—Byers (1988:10).

The mobile phone uses microelectronic components, made possible by the precision concepts introduced by Maudslay. And of course the mobile phone uses wireless technology, and battery technology.

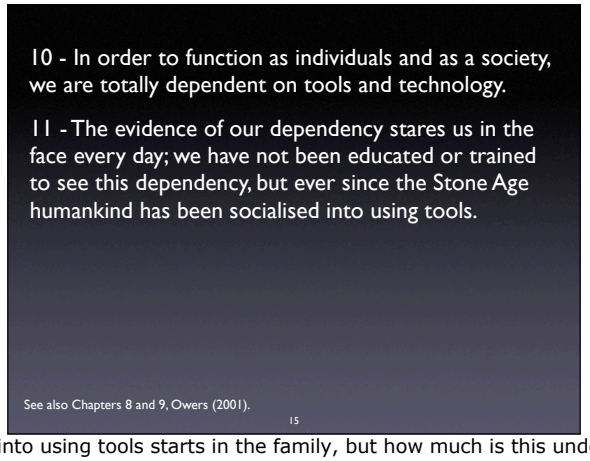
This is but a small insight into our tools and technological inventory which by any standard is vast beyond our comprehension.

Here are the next two statements.

14

The mobile phone extends our productivity and our capability; we can make a phone call any time we choose without recourse to a fixed installation in the home or the office. Mobile phones have proven their capability also in lifesaving situations for people capsized at sea, or who are stuck in bad weather in a dangerous situation on a mountain.

See also Chapters 1 and 4, Owers (2001). Here are the last two statements:



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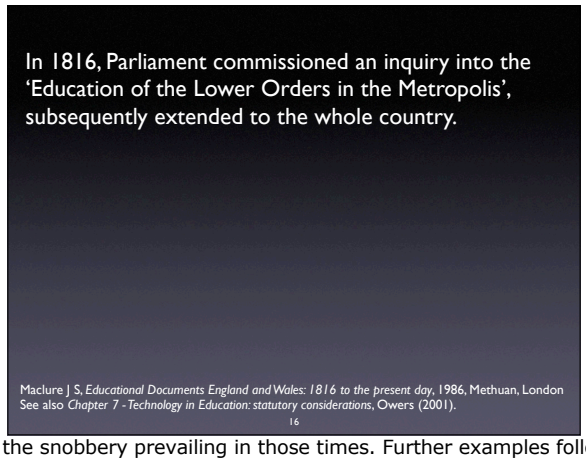
The process of socialisation into using tools starts in the family, but how much is this understood? Although we are totally dependent on our tool- and technology-culture, our society has never learnt to value the essential creative nature of our tool- and technology-culture for us to remain competitive as an industrial and trading society.

In fact the language of our opinion leaders has too often provided statutory sanction for disparagement, and I shall now show you some examples.



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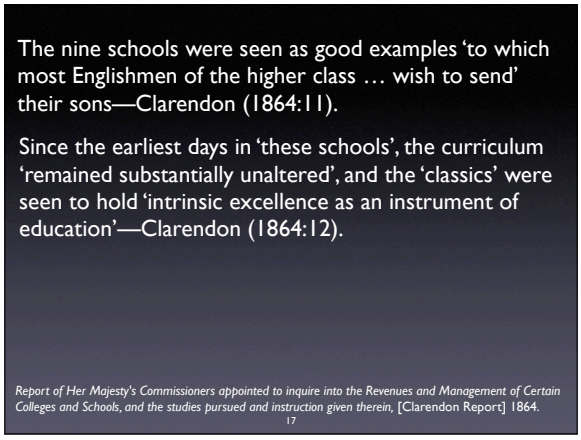
This provides an example of the snobbery prevailing in those times. Further examples follow as a small selection from a huge field that helps us to understand the value judgments endemic in our society. But it also helps us to understand how the past is in the present. Here is the next example:



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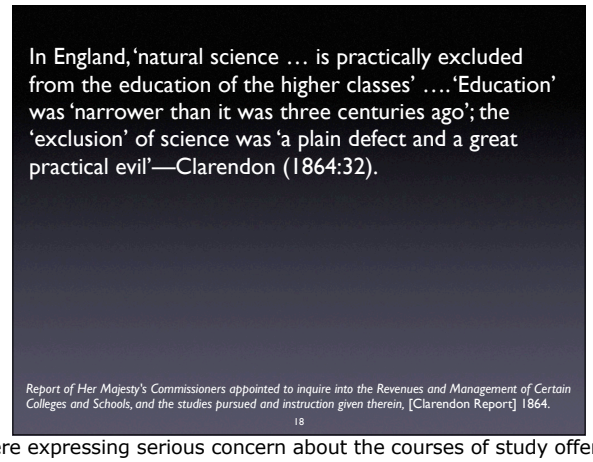
More snobbery!

Here is the next example:



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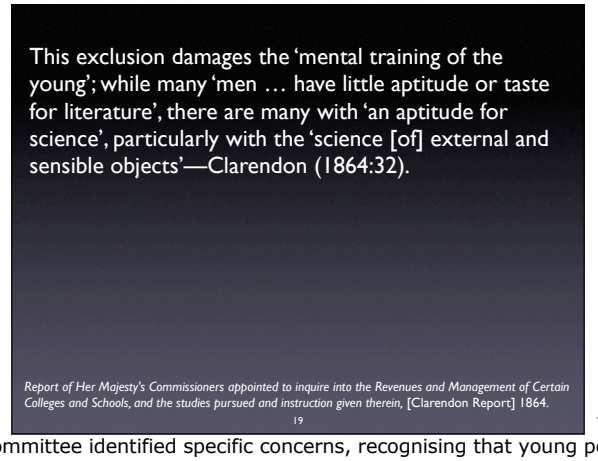
So this select committee were expressing serious concern about the courses of study offered by the public schools, and their report went on:



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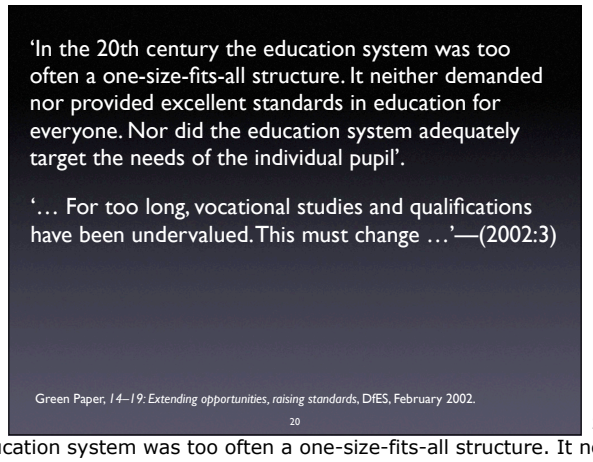
As you can see the select committee identified specific concerns, recognising that young people had different aptitudes which education needed to take into account.

Recently, there was yet another attempt to confront this problem. In the Green Paper published February 2002, Estelle Morris the former Secretary of State for Education and Skills, wrote (see next slide):



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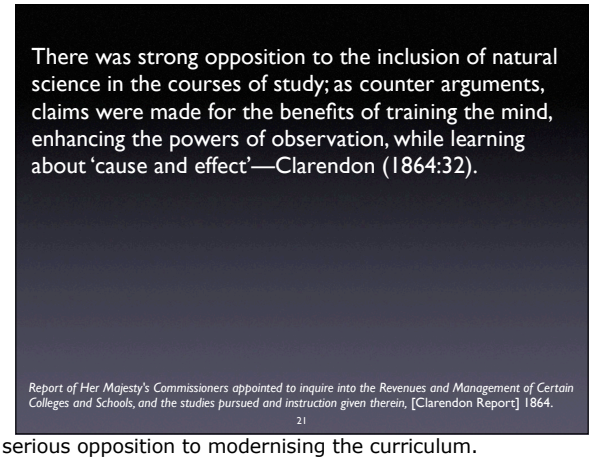
'In the 20th century the education system was too often a one-size-fits-all structure. It neither demanded nor provided excellent standards in education for everyone. Nor did the education system adequately target the needs of the individual pupil.

In the 21st century, to be prosperous, the economy will depend heavily on the creativity and skills of its people. In a knowledge economy it is vital that we tap the potential of every one of our citizens.

… For too long, vocational studies and qualifications have been undervalued. This must change – we must introduce qualifications and pathways that are of an excellent standard, that deserve and are accorded high status, that are not a sink option for failed students, but which can lead the bright and able through into higher education and beyond. …'—(2002:3)

But of course changes have yet to be implemented, and in particular our obsolete value judgments have to be recognised for the damage they are doing to our economic prospects. Back to the Clarendon Report.



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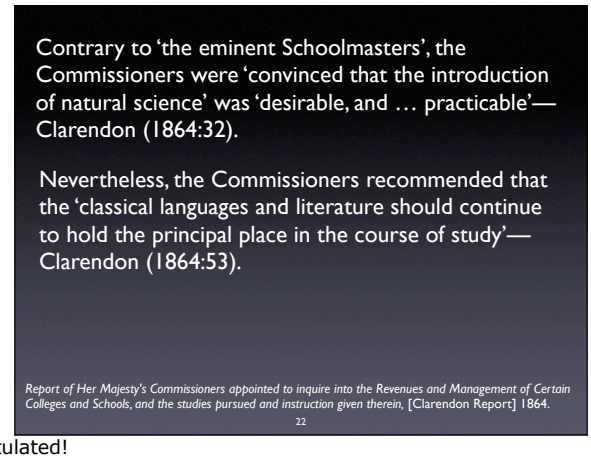
As may be seen, there was serious opposition to modernising the curriculum.



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So the Commissioners capitulated!

Let us now examine another select committee publication, namely the Taunton report.

The time that parents were prepared to 'keep their children under instruction' defined the groups of educational provision—Taunton (1868:15)

There were three groups—up to 'about 14', up to 'about 16', and up 'to … 18 or 19'; these were classified as 'Third', 'Second' and 'First-grade of Education respectively'—Taunton (*ibid*).

Schools Inquiry Commission, [The Taunton Report], The House of Commons, 1868.
See also *Chapter 7 - Technology in Education: statutory considerations*, Owers (2001).

23

23

Note the gradings.

Schools that provided the First-grade of education were patronised by 'two very distinct classes' of parent. 'One class' were similar to those parents who favoured the public schools covered by the Clarendon report—Taunton (1868:16).

Schools Inquiry Commission, [The Taunton Report], The House of Commons, 1868.
See also *Chapter 7 - Technology in Education: statutory considerations*, Owers (2001).

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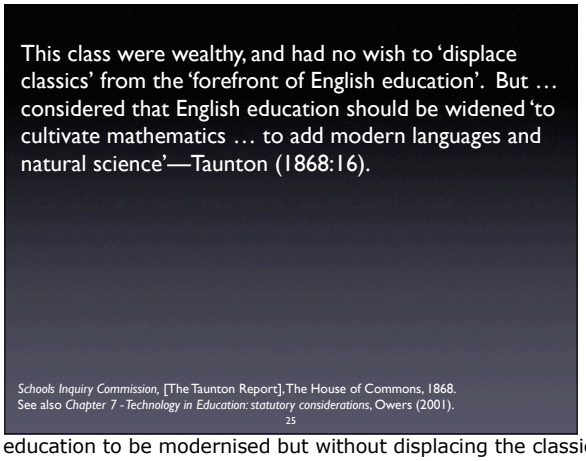
So the gradings were based on class distinctions.



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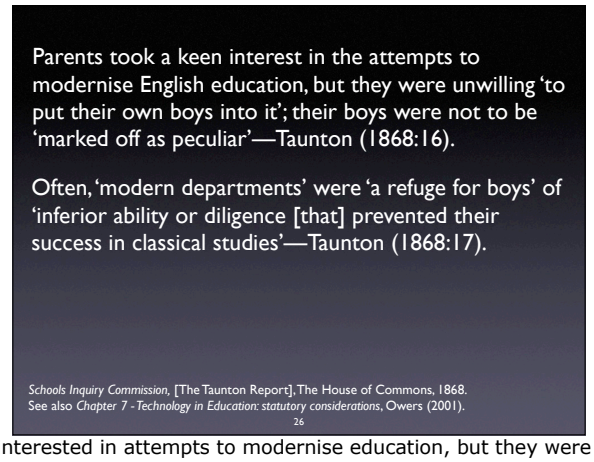
The wealthy parents wanted education to be modernised but without displacing the classics.



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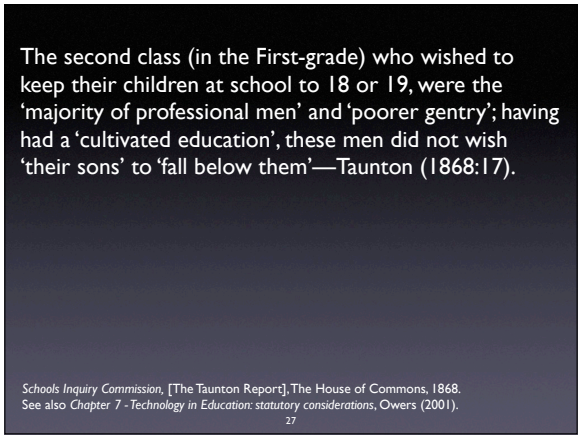
In summary, parents were interested in attempts to modernise education, but they were not willing to be part of the change process. Furthermore, those with little or no aptitude for the classical languages were regarded as having 'inferior ability'. This of course was seriously prejudicial, ignorant and technologicaly illiterate.



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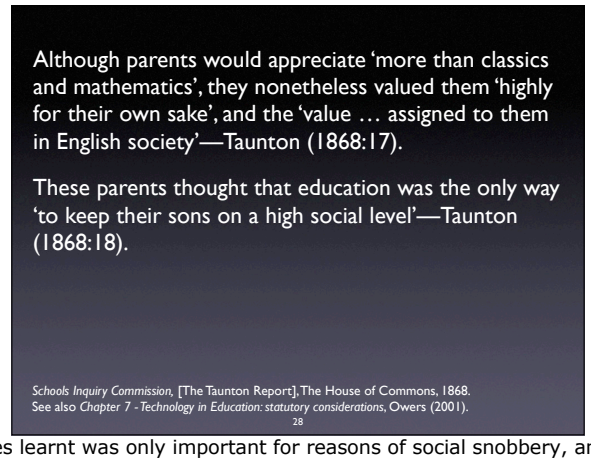
Another example of snobbery.



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What the sons of those times learnt was only important for reasons of social snobbery, and had nothing to do with earning a living or sustaining ourselves as a society.

For boys up to 16 years in the Second-grade, parents required a different education… These parents comprised 'two classes': (1) those who accepted Latin as useful for certain 'professions' as well as its 'social value', and (2) 'the mercantile classes' who 'barely … tolerate Latin'—Taunton (1868:18).

Schools Inquiry Commission, [The Taunton Report], The House of Commons, 1868.
See also *Chapter 7 - Technology in Education: statutory considerations,* Owers (2001).

29

29

This is the conflict that still dogs us today 'social value' versus an education with a practical use although we live in a technological age.

This second group thought 'mathematics, modern languages, chemistry … physical science' were 'essential' … 'Classical culture' was an acceptable 'instrument of education', provided the modern subjects 'considered indispensable' were not excluded—Taunton (1868:20).

Schools Inquiry Commission, [The Taunton Report], The House of Commons, 1868.
See also *Chapter 7 - Technology in Education: statutory considerations,* Owers (2001).

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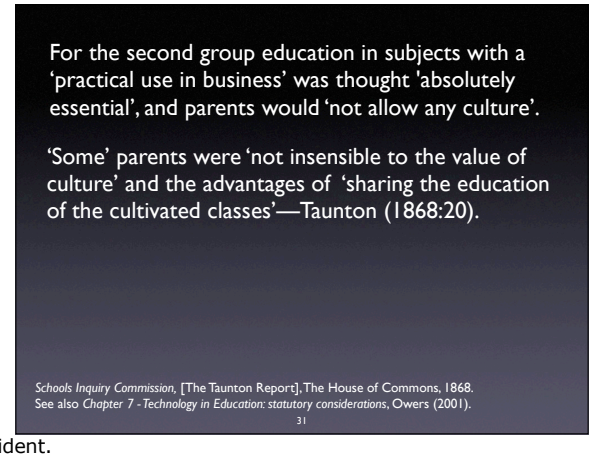
So parents had very different requirements from education, and as was said earlier this was recognised only recently by Estelle Morris in 2002, ie 134 years later! But to continue with the Taunton Report.



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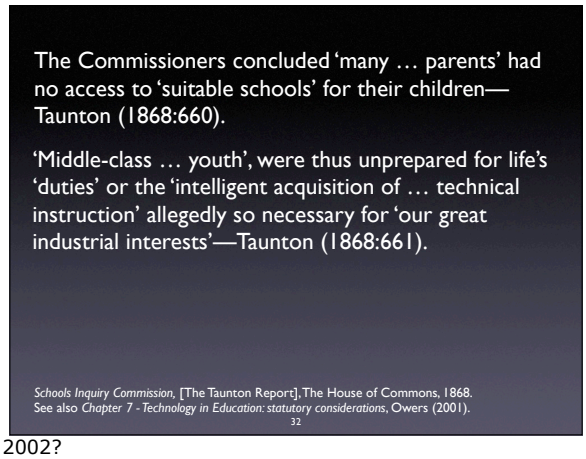
So snobbery was always evident.



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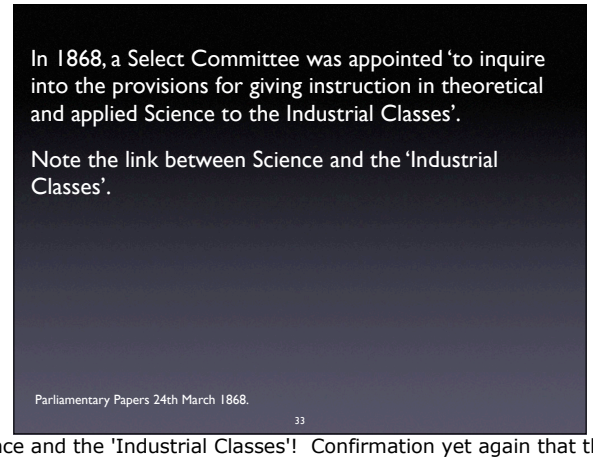
Remember Estelle Morris in 2002?

As you can see, our great industrial interests were of little consequence to the upper classes, and this was reinforced by the next select committee report.



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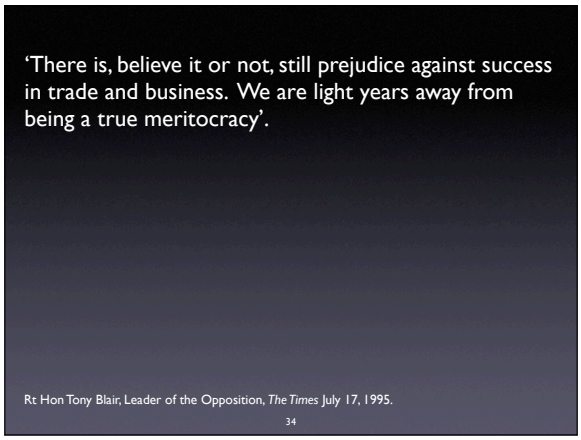
Note the link between Science and the 'Industrial Classes'! Confirmation yet again that the collective economic well-being of our country and our society came second, and I believe it still does!

Now for examples of anecdotal evidence disclosing the value judgments of our society against trade, industry, business, and professional engineers; failing also to comprehend the role of technology in our society. In effect, the values of the upper-classes not only influenced our education system, but many other institutions as well. Much of the anecdotal evidence is founded on prejudice and alarming levels of ignorance.



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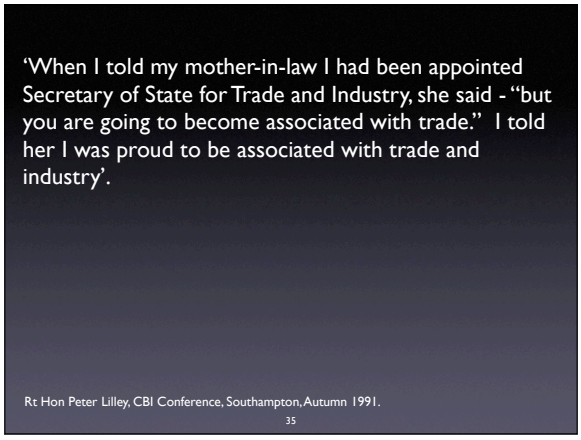
Anecdotal evidence.



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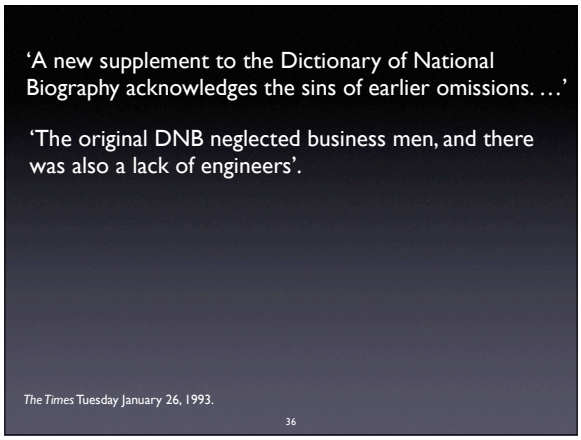
Anecdotal evidence.

From my thesis for reference as back-up if required: Before 1760 there was no concerted hostility towards industry and business in the UK, but that changed in the period up to 1790. This change was driven by forces outside education, but the cultural context and associated value judgments have significance here.

The origins of hostility towards business in modern Britain have been studied by Raven (1985). His dissertation, entitled *English Popular Literature and The Image of Business 1760–1790*, considers two aspects—Raven (1985:1). Firstly 'the commercial growth of the book trade and the social impact of popular literature', and secondly, the 'attitudes' and 'prejudices' in the literature 'promoted' by the 'writers' and 'booksellers'—Raven (*ibid*).

Popular literature in the 16th Century showed no disapproval of 'merchants and tradesmen' although they 'certainly indulged in fashionable conspicuous consumption'—Raven (1985:134). Until the early 17th Century, the portrayal was usually 'generous' depicting 'mercantile pride and self-esteem'—Raven (*ibid*).

Here is the next anecdote:



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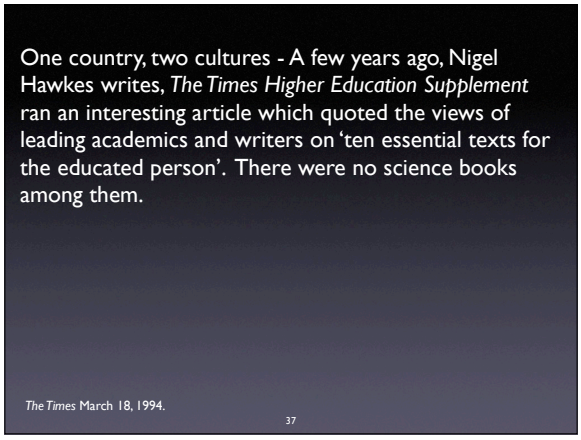
Anecdotal evidence.
The prejudicial influence spread to those responsible for producing the DNB. Ignorance of this kind threatens our ability to sustain ourselves economically in a fiercely competitive world.

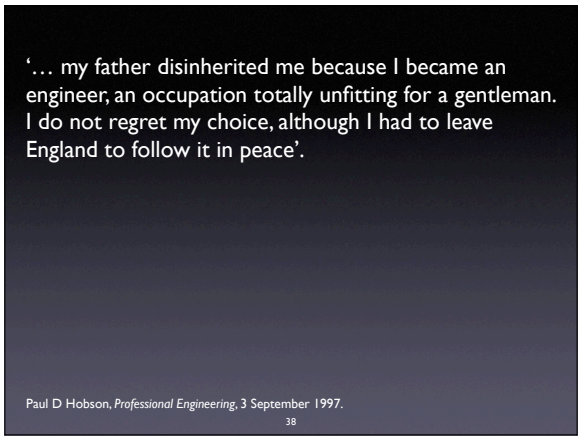
Here is the next anecdote:



37

Anecdotal evidence.

Here is the next anecdote:

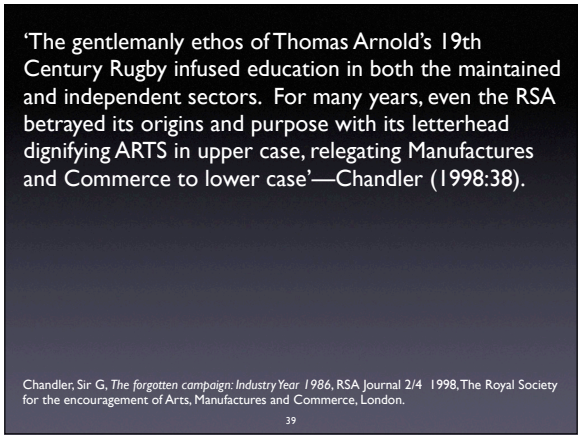


38

Anecdotal evidence.

How tragic for father and son!

Here is the next anecdote:



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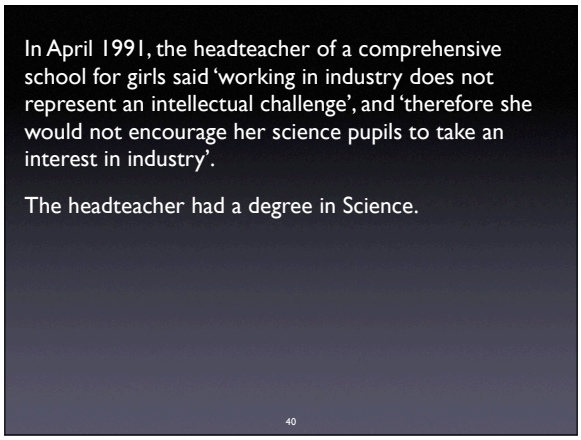
Anecdotal evidence.



40

Anecdotal evidence.

The head teacher had a degree in Science, and a frightening level of economic and technological illiteracy.

‘If he is going to be an engineer he doesn't need English’. Said by a headteacher to a parent when the son had failed his English O–level.

‘We are not in the business of producing fodder for factories’–said by both primary and secondary school teachers.

‘One of my teachers told me I was too intelligent to become an engineer’.

41

41

A selection of three anecdotes.

‘For my A-levels, I wanted to do Engineering Drawing and Technical subjects. My teachers were horrified and told me “… you will be joining all the E-stream pupils”.’

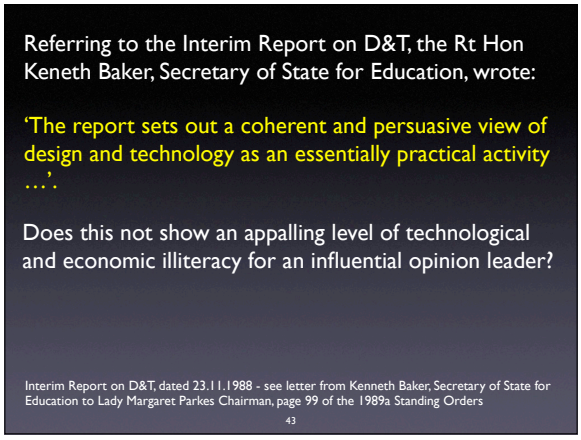
‘They wanted me to do Classical or Humanities subjects which were regarded as respectable. I did what I wanted to do, and some of the teachers never spoke to me again in my time at that school’.

Note: This person went on to become a Professor.

42

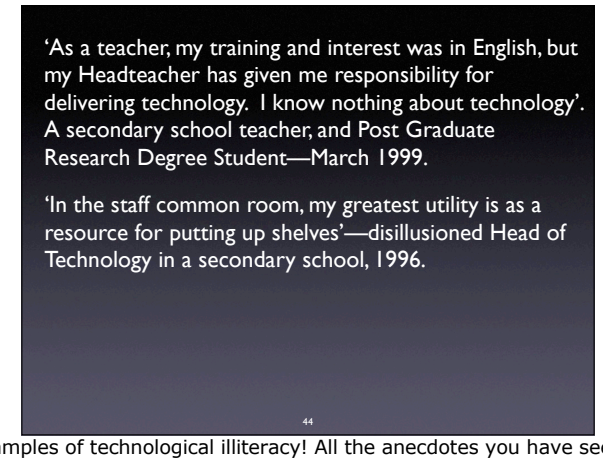
42

Anecdotal evidence.



43

Anecdotal evidence.
This shows an appalling level of technological and economic illiteracy for an influential opinion leader.

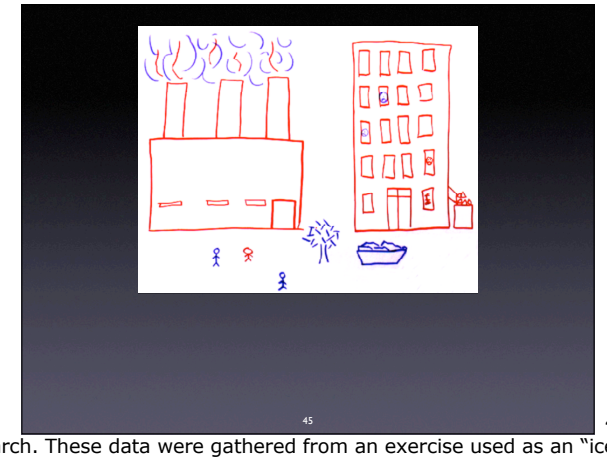


44

These are two dreadful examples of technological illiteracy! All the anecdotes you have seen come from appendix 5 of my thesis, which lists some 65 in total.

I would now like to show you a number of slides from action research evidence. They come from an exercise I used as an "ice breaker" when lecturing student teachers in training on economic and industrial understanding.

The class of student-teachers were asked to form subgroups of 4 or 5, and to spend 5 minutes reflecting on their perceptions of industry. Then come to some consensus, and commit their shared point of view to a piece of flip-over chart paper. The next four slides provide actual examples.



Evidence from action research. These data were gathered from an exercise used as an "ice breaker" when lecturing student teachers in training on economic and industrial understanding.

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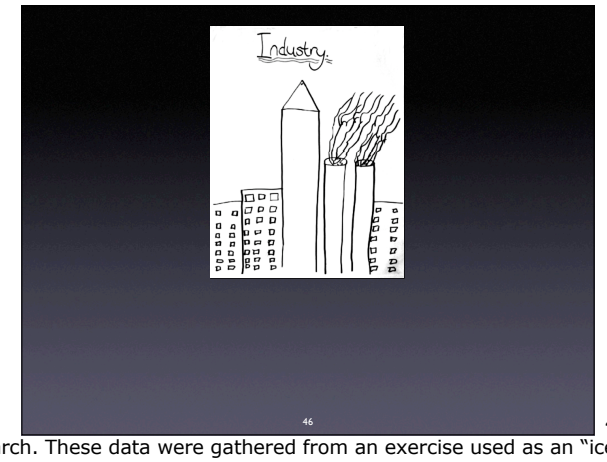

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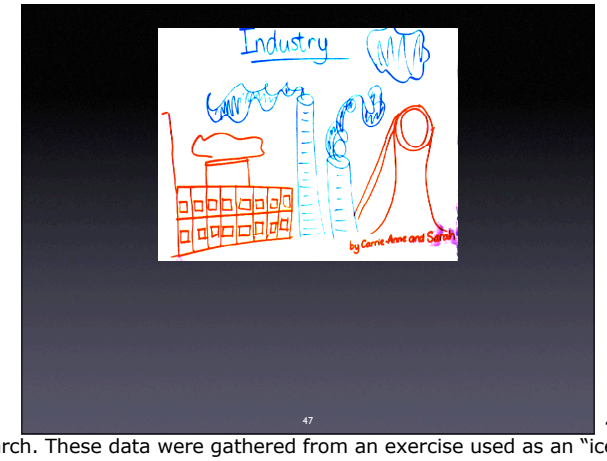

47

Evidence from action research. These data were gathered from an exercise used as an "ice breaker" when lecturing student teachers in training on economic and industrial understanding.

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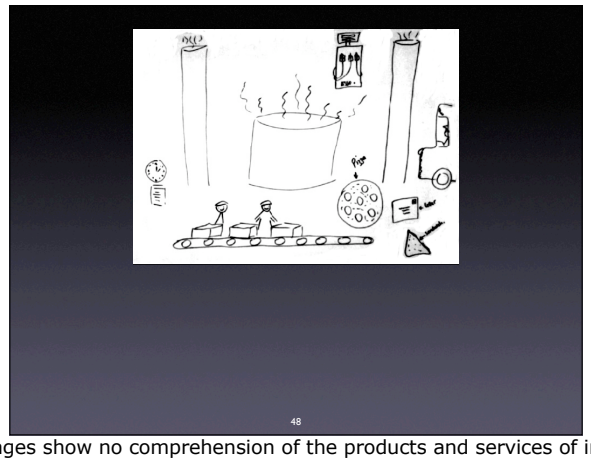
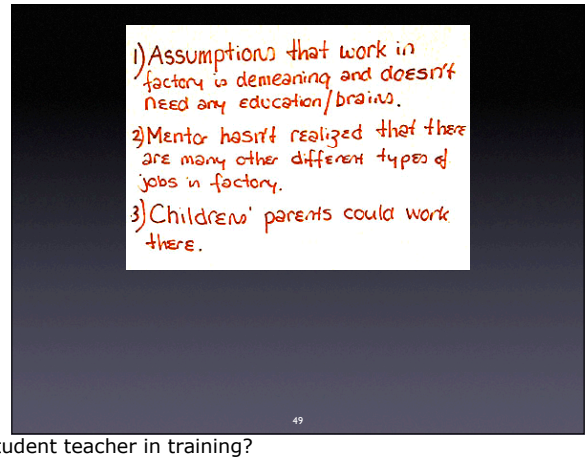


48

These four flip-over chart pages show no comprehension of the products and services of industry upon which our society is totally dependent. As you can see they showed a preoccupation with smoking chimney stacks at a time when great technological strides had been made to reduce pollution from stacks. So the impressions were essentially negative.

The next two slides provide evidence from further action research.



49

What was concerning the student teacher in training?

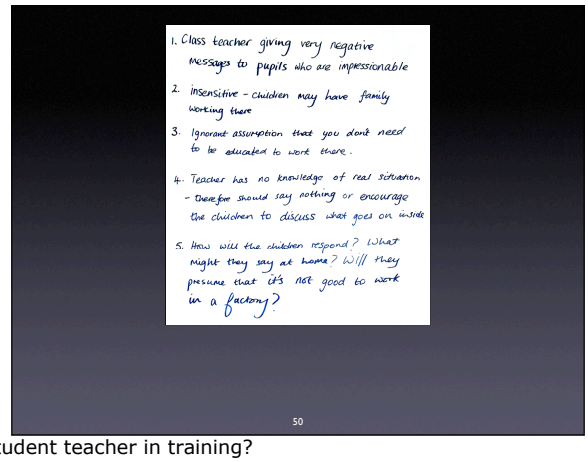
In 1966, 17 student teachers on a Four Year BEd course chose an option entitled *The Contribution of Industry to the School Curriculum*.

Action research was conducted with this group recounting a personal experience that related to the testing of a questionnaire with a group of licensed teachers in 1993.

After completing the test , one student had a serious concern. Her Mentor had taken a class of primary school children on an outside trip. As they passed a factory, the Mentor paused, gathered the pupils around and said: "Now if you don't do well in your studies that is where you will finish up". The Mentor had no idea that prototype cars costing more than £100,000 each were made in the factory.

The licensed student teacher was horrified, but chose to say nothing because she wanted to qualify. This experience troubled the licensed student teacher because children could be learning to disparage the occupations of their parents, and hence the parents. The student teacher was told that what she had witnessed was a commonplace event, and symptomatic of the anti-industry culture that prevails in our society.

This experience was used as the basis for action research with the students on the Four Year BEd, and at a point about 25% into their course. The 17 students were asked to split into subgroups of four or five, and without being told about the traditional anti-industry culture, they were asked to reflect on 'what was concerning the student licensed teacher in training' and to commit their shared point of view to a flip-over chart.



50

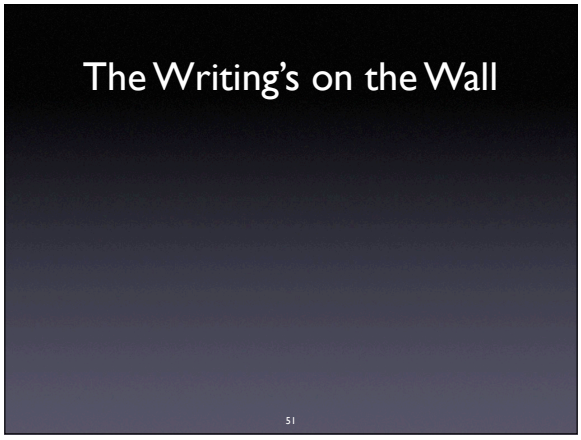
What was concerning the student teacher in training?

1. Class teacher giving very negative messages to pupils who are impressionable.
2. Insensitive – children may have family working there.
3. Ignorant assumption that you don't need to be educated to work there.
4. Teacher has no knowledge of real situation – therefore should say nothing or encourage the children to discuss what goes on inside.
5. How will the children respond? What might they say at home? Will they presume that it's not good to work in a factory?

As I said earlier, we should not be surprised by anything shown here in this presentation. The culture and the values of the critical mass in our society have disparaged industry and technology for more than 200 years.

However, I believe that understanding the "cultural sphere" helps us to confront our damaging value and belief systems.

Now another video produced for Industry Year *1986* that asks the question "What is education for?" and covers many of the issues in the "cultural sphere".



51

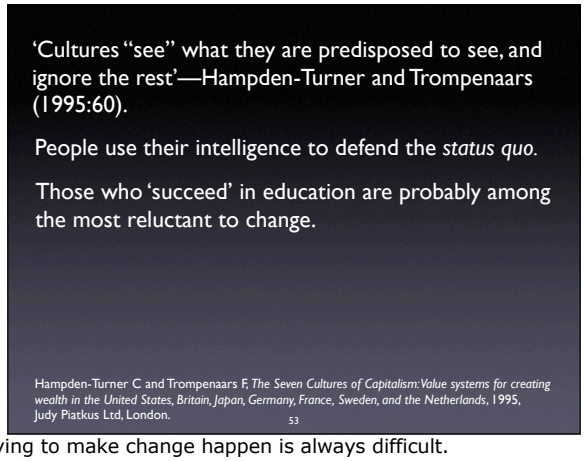
What can we do?

52

What can we do? I believe this Minister hit the nail on the head!

You may recall Dahrendorf (1976:460) argued '… an effective economic strategy for Britain will probably have to begin in the cultural sphere, in attitudes, habits, expectations', and now I trust you can see why.

In the context of sustaining ourselves economically, we have had more than 200 years of cultural failure in the philosophical direction. The value judgments responsible are now deeply embedded in our psyche, and therefore not only hard to see but even harder to change. So trying to make change happen will be difficult; the difficulties arise also because:



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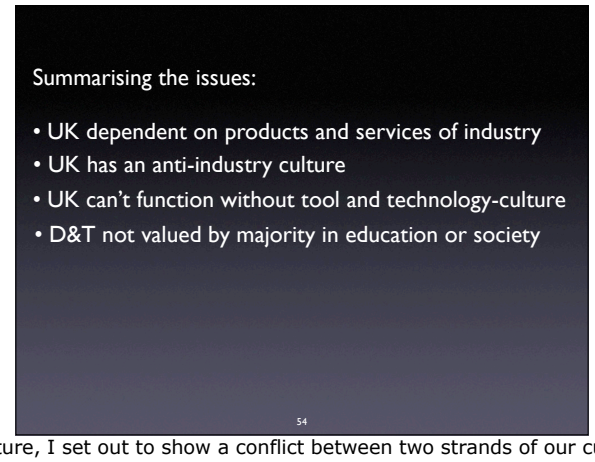
Some of the reasons why trying to make change happen is always difficult.



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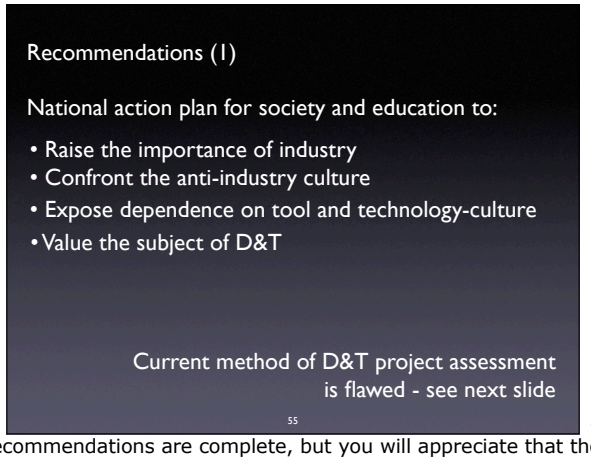
At the beginning of this lecture, I set out to show a conflict between two strands of our culture, and here we see the dilemma in two ways. We are dependent on the products and services of industry, but we have an anti-industry culture. Furthermore, we can't function without our tool- and technology-culture, but D&T is not valued by the majority in education or society.



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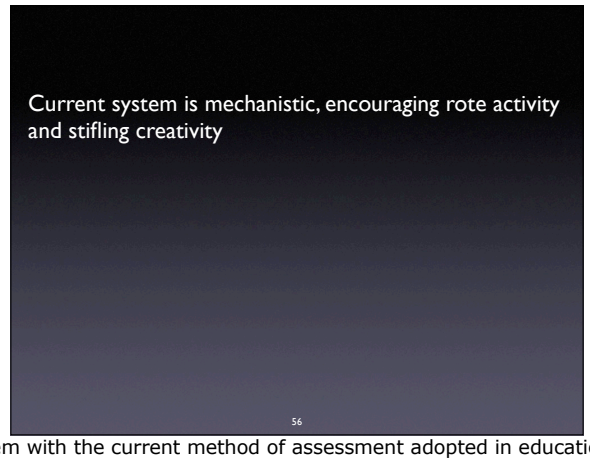
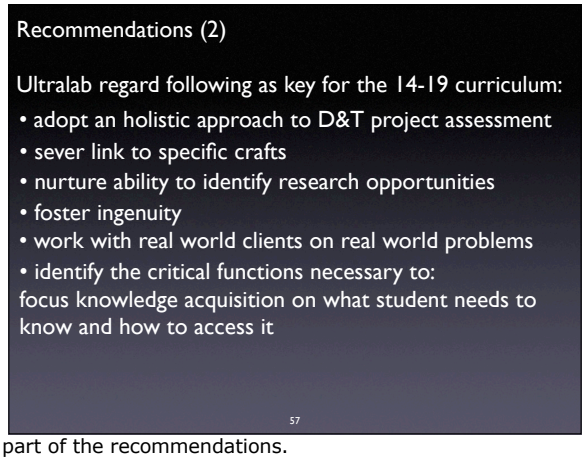
We don't pretend that our recommendations are complete, but you will appreciate that the task is exceptionally difficult. The recommendations are in two parts; this shows the first part.

There is a serious problem with the current method of assessing D&T projects in education, and that is identified on the next slide



56

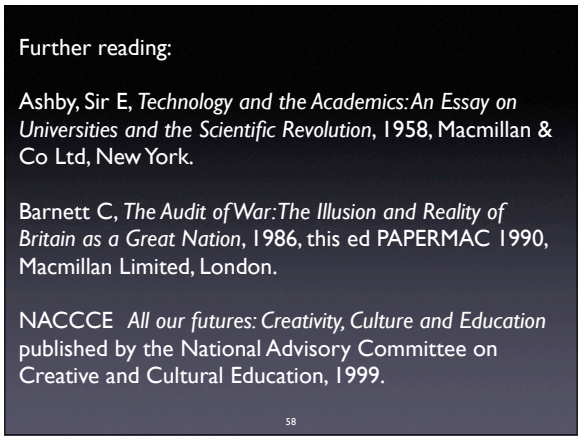
But there is a serious problem with the current method of assessment adopted in education, and it is addressed in the second part of the recommendations.



57

Here is the second and final part of the recommendations.

That concludes my presentation.



58

Further reading.

Rae J, *Our Obsolete Attitudes: Education & the National Malaise, Encounter*, 1977, Vol. 49 pp10-17. Headmaster of Westminster School, and former headmaster of Harrow public school.

Sharon D, *Technical illiteracy*, *EDUCATION*, 21 July 1989, London.

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Wiener M J, *English Culture and the decline of the Industrial Spirit 1850–1980*, 1981, Penguin Books, London.

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More reading.

Dr Stan Owers
Industrialist in Residence and Researcher
Ultralab
Anglia Polytechnic University
Chelmsford
Essex

60

60

The author.