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Citation: PEACOCK, 1997. Discourses of technology education. IDATER 1997 Conference, Loughborough: Loughborough University

Additional Information:

- This is a conference paper.

Metadata Record: [https://dspace.lboro.ac.uk/2134/1459](https://dspace.lboro.ac.uk/2134/1459)

Publisher: © Loughborough University

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Discourses of technology education

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Abstract
The paper examines the potential of policy discourses in an educational reform process to produce regimes of truth about what comprises technology education. The discourses which form the analysis are to be found in education policy, curriculum texts, minutes of curriculum committees, and programmes provided to upgrade teacher expertise in a situation where, in New South Wales, mandatory study of Design and Technology has replaced previous study in Industrial Arts and Home Economics.

Foucault believed that, whilst discourses were comprised of a group of statements that function together to form a regime or version of what is allowable to think and do, these discourses represented but a partial narrative of the world. The contestation between teacher groups with vested interests about the nature of technology curriculum can be addressed with reference to Bernstein’s rules of distribution, recontextualising and evaluation as part of pedagogic discourse.

Curriculum developed outside the classroom is constantly modified and redeveloped as part of the prevailing social and economic context of schooling. Discourses thus have a shelf life which reflects varying positions of power at an historical point in time.

This paper is concerned with the discourses of technology education that have been apparent as curriculum has been reformed in Australia, specifically in the state of New South Wales. It accepts Novoa’s suggestion that, for wide scale educational reform to be achieved, a discourse is necessary, “a logic of action” which enhances the reform as “the sum total of evidence as if the decisions could not have been different”. As previous disparate subjects have been grouped as a field of study known as Technology at the national level, and as Technological and Applied Studies at the state (New South Wales) level, differential positioning of subject knowledge has occurred. Knowledge held to be valuable bears a direct relationship to prevailing economic and social conditions, and reflects principles of power and control. The premise within this curriculum reform that the knowledge and processes of the new subject, Design and Technology, could eliminate existing gender biases in home economics and industrial arts subjects in secondary schools is questioned.

Curriculum reform across the last decade has revealed competing discourses of technology education based on: national concerns with economic conditions; state concerns to promote excellence and equity; specific concerns to address gender bias; and on the vested interests of practitioners who seek specific outcomes from the process of curriculum development. These have resulted in a curriculum area which, eight years after its formation, remains fraught with tensions about the knowledge that should be valued in technology education.

Foucault’s contention that discourse consists of groups of statements which, by virtue of being part of an ongoing conversation, come to form a regime of truth is useful to understanding the development of technology curriculum. Foucault used the concept of discourse to describe that which was constructed within historical and social spaces to become accepted knowledge. Foucault believed that “every society has its regime of truth, its general politics of truth; that is the types of discourse which it accepts and makes function as true”. This truth was dependent, in the short term, on power to name and give meaning to phenomena. Further, Foucault believed that power, rather than being a deterministic factor, was illusory, existing only in action, and affected constantly by resistance.
Foucault’s concept of discourse included who was allowed to speak and with what authority. Thus, an analysis of the discourses of technology education allows for the identification of both sanctions and resistances at play in the development and implementation of technology curriculum.

Discourse of educational reform
Australia, like other Westernised countries, has experienced economic downturn in the last decade. This has been translated into a political preoccupation with restructuring education, thus making education both the cause and the solution to the problem. As early as 1986, a discussion paper, called for the development of technological competencies which could enable people to:
- use technologies
- understand how they work
- analyse their likely impacts
and then, using social, political and organisational skills, determine their wise future use.3

In 1989, State and Territory Ministers of Education acting as the Australian Education Council agreed to national goals for schooling, including the goal of responding to economic and social needs, with provision for understanding of the world of work. A nationally-developed curriculum was produced for the purpose of organising general curriculum. Simultaneously, committees with strong links to business and industry created a set of key competencies to guide workplace training. As a result of these activities, vocational knowledge has been given increased status in the curriculum.

Excellence and Equity4, the 1989 NSW reform document, argued for a “balanced education with opportunities to develop technological and vocational skills within the context of a broad education”.4 This report cited community unease with the quality of education, based upon supposed lack of essential skills, poor motivation, and inappropriate learnings. The Technological and Applied Studies learning area was established to provide knowledge of design; understanding of applied science; experience of specific technologies; and to develop skills of critical analysis. A specific commitment was made to equality of opportunity through development of subjects which would “meet the educational needs of girls and boys and emphasise knowledge and skills which are valuable to girls as well as boys”. Equity was described as opportunity to experience success “provided they (girls and disadvantaged children from non-English speaking and Aboriginal backgrounds) are willing to make the necessary personal commitment and effort”.5

Discourse of gender equity
In the NSW curriculum reform documents, girls are ‘labelled’ as disadvantaged, and liberal assumptions that state intervention is necessary and desirable are evident. It is implied that equality of opportunity will redress any identified disadvantage, and further, that any inequitable outcomes can be blamed on lack of commitment and effort on the behalf of the intended participants in the adjusted curriculum.

Gender stereotyping of existing subjects destined to be fitted into the Technological and Applied Studies key learning area posed a major drawback to learning. Girls were portrayed as receiving limited access to technology and design through existing subjects such as Home Science, Textiles and Design, and Art, whilst boys were portrayed as having narrowly focused access through Industrial Arts, Technics and Industrial Technology. The solution would be found “in the context of a new, integrated course which can be relatively free of gender identification”.6

Only the mandatory period of study, 200 hours at the commencement of secondary schooling, was relevant to the situation. Beyond this introductory experience, neither the current nor the proposed curriculum guaranteed further study in elective subjects related to technology education. The writers of Excellence and Equity further assumed that a gender free subject, namely Design and Technology, could be both constructed and delivered. Such an assumption ignores Foucault’s contention that discourses are fluid and constantly revised in social and historical context. The bureaucratic position taken towards a new subject as a panacea ignored a more critical interpretation that would
recognise such a possibility as constrained by structural conditions, including the need for changed attitudes of teachers.

All students had, since the introduction of a Non-sexist Education Policy in 1979, been exposed to both Industrial Arts and Home Economics in the mandatory curriculum. After evaluation of the Non-sexist Education Policy revealed that little had changed in school practices, a further NSW policy, the Girls' Education Strategy, had been released in 1988. The theoretical orientation of this policy was more closely linked with a socialist feminist interpretation and suggestions for affirmative action were made, including the need to enhance girls' learning in mathematics and science. Given the history of the previous unsuccessful policy for non-sexist education and no evidence that the Girls' Education Strategy would impact on school experiences, the likelihood of delivering a gender-free subject in technology education as part of the 1989 reform was limited.

Notwithstanding, development of a subject identified in Excellence and Equity as Technology and Design proceeded apace. The popular expectation of the outcome as perceived by teachers was that home economics education would vanish from the curriculum. Home economics educators, perceiving themselves as having most to lose in terms of valued knowledge, began a state-wide process of drafting position papers directed to the Board of Secondary Education. These papers sought to establish the already existing use of design processes, the understandings of applied science and the impacts of science and technology on social, physical and home environments, as well as the provision of experiences with specific technologies through use of a range of materials, tools and techniques. This was a process of resistance to proposed change, an attempt to direct the outcomes of specific discourses naming who was entitled to a share of the technology curriculum at the levels of both knowledge valued and teacher expertise. These actions resisted the prevailing perceptions of a home economics curriculum held by curriculum reformers, and argued a position of home economics knowledge within technology education as normal.

Popkewitz reminds us that discourses of reform assume meaning in the context of complex social relationships. In late 1990, the newly formed Board of Studies established a Key Learning Area Co-ordinating Committee (KLACC) for Technological and Applied Studies with two tasks - to establish a framework statement to guide all future curriculum development in the learning area, and to develop the new gender-neutral syllabus. The committee structure did not follow the established committee formula but was supposedly representative of interest groups in technology education. Twenty eight members began the task of curriculum development. The gendered composition was eight females to twenty males, plus a male chairperson. One of the eight females attended only one meeting of the group.

Board staff and other KLACC members brought to the process their individual 'truths' about technology education. An investigation of National Technology curriculum in England was used as a reference point. One conclusion of this investigation was that technological capability should be the desired outcome, to be achieved by providing a wide range of experiences for all students. This gave credence to a discourse of technology education established on the other side of the world, for a totally different social context.

In any curriculum design, structures impose boundaries on what it is allowable to think. That the curriculum was eventually retitled Design and Technology reflects something of the competing views leading to the final product. The word 'technology' was perceived by female members of the committee to suggest a masculinist view of the subject. This was supported with reference to a wide range of research suggesting a view of girls as deficit in technological and scientific understandings (Yates, 1990; Kelly, 1987; Wajcman, 1991; Taylor, 1992; Spender, 1989). Reversing the names in the title was seen as softening the gendered perception of the subject. Within the curriculum, the structural requirement to organise classroom experiences around six of ten contexts was an attempt to ensure students were exposed to technologies in home, commercial and industrial domains of life, and to establish that teachers of technology
education would be drawn from a range of previous subject areas, including home economics, industrial arts, agriculture and computing.

Teacher resistance to the technology curriculum becoming masculinist in content knowledge and delivery was also undertaken through union auspices. A group of home economics teachers met with the Director General of Education, Fenton Sharpe. Herbert, the deputation leader, reported that he had assured the group that “he always thought of home economists as technologists”\[10\]. The outcome of this was a memorandum circulated to all school principals stating that teachers of home economics, as well as teachers of Industrial Arts had the expertise to teach in the Technological and Applied Studies learning area.\[11\] While this served, in the short term, to guarantee a right to teach Design and Technology, further resistance occurred in the shape of perceptions of principals, control of examination committees and unwillingness of teachers to adjust pedagogical practices at the school level.

Discourse of pedagogical change

The Department of School Education was enlisted to establish a discourse of pedagogical change built around teacher retraining, and monies from a mandatory retraining levy imposed on employers by the Federal government were directed to this purpose. Content within the retraining course served two functions - to multi-skill across technologies, and to redirect classroom practices towards a more child-centred pedagogy. Technology education consultants were provided in each Region of the State to facilitate the retraining process and to assist schools directly with the requirements of a changed curriculum.

The new technology syllabuses contained statements valuing co-operative learning techniques and classroom experiences relevant to the understandings of both males and females. This reflected a large body of research suggesting that early socialisation patterns establish a predilection for scientific and technological understanding in males whilst females are more likely to develop language and discourse skills. For example, Kramarea and Treichler\[12\] claim that males who are socialised towards an individualistic competitive perspective become comfortable with interaction based on individual expertise and abstract concepts. Conversely, Hensel\[13\] reports that girls create a process they cannot see by using words rather than mental pictures. Assessment patterns suggested for Design and Technology attempted to reward both written and practical expertise. This represented a significant change in thinking about the nature of appropriate learning outcomes in technology education, wherein traditional assessment had been product based.

Whilst an attempt was made to offer retraining to a balanced cohort of male and female teachers representative of the range of contributing subject areas, teacher resistance was evident from those of an Industrial Arts background. Both in seeking retraining and in commitment to change, female teachers displayed and continue to display less resistance to change.

Similarly, reluctance of tertiary educators to change their practice has placed the training of new teachers for Design and Technology in jeopardy with Universities, at a time of economic rationalisation, placing this challenge in the “too hard” basket. No NSW University trains home economics educators. Attempts by some Universities to produce a multi-skilled Design and Technology teacher have met with resistance from in-school personnel committed to the prior curriculum and thus a predicted shortage of teachers of technology is now being used to argue for a return to previous curriculum subject divisions.

This situation lends itself to interpretation using Bernstein’s pedagogic device\[13\]. What is thinkable about technology education can be related to distributive rules which Bernstein claims are established by the higher agencies of education, in this case the Board of Studies, curriculum committees and inservice trainers. Power relations among these players serve to modify the discourse. In the process of curriculum development, the discourse is
largely imaginary - that is, what can be achieved in the classroom is predicted rather than proven. As Bernstein notes, recontextualisers are rarely producers of the knowledge and so, as the new subject is implemented, the discourse is recontextualised and the curriculum is so modified in line with teachers' ideological beliefs. Evaluative rules define standards and regulate consciousness. In terms of Design and Technology education, evaluation occurs at three levels: teacher reflection on classroom practice; external evaluation of student outcomes through examination processes; and research by the Board of Studies.

The process of development of Design and Technology curriculum in NSW exemplifies Foucault's notions of regimes of truth being constructed through competing discourses, being met with resistance, and thus constantly under revision. Analysis of the implementation of the technology curriculum can be assisted by engaging Bernstein's pedagogic device, as the rules identified become resources for appropriating and legitimating discourse. Whose interests are served, or not served, becomes more transparent and the social production of a curriculum discourse can be equated with a struggle over whose knowledge is deemed legitimate.

References
5 Ibid., p.10.
6 Ibid.
7 NSW Department of School Education. Non-sexist Education Policy Sydney: Author, 1979