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LOOKING BACK TO THE
FUTURE

John Horwood

(6 TEACH 3)

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FOOTSCRAY INSTITUTE OF TECHNOLOGY
VICTORIA UNIVERSITY OF TECHNOLOGY
BALLARAT ROAD (P O BOX 64), FOOTSCRAY
VICTORIA, AUSTRALIA 3011
TELEPHONE (03) 688-4249/4225
FACSIMILE (03) 687-7632

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Looking Back

In viewing public secondary education today it is difficult to realise that this institution had its origins in the first decade of this century; and that universal secondary education only came of age in the late nineteen fifties.

Such have been the demands and the pace of events in current times that it is easy to overlook the events of the recent past. But an understanding of these events may provide us with a clearer perspective of current developments in the educational scene.

The educational scene is a kaleidoscope of cascading perspectives - this is but one, an attempt, from a Victorian perspective, to focus on certain political and cultural factors involved in the struggle for a mathematics curriculum.

It was the Labor government, in the 1940s in a post-war society, which initiated the involvement of a national government in the educational affairs of the country. When Chifley was voted from office in 1949 the legacies were a modest system of grants for university finance; a scheme for Commonwealth University scholarships (which were subsequently enacted by a Liberal government); and the Commonwealth Office of Education.

These legacies may well have appeared to be modest, but the achievements were far-reaching. The principle of Federal government involvement in the educational affairs of the nation was established, and with it, the expectation of the Commonwealth to play a leading role in the development of education. The impact was first felt in the area of post-secondary education, especially in the university and, later, the advanced education sector.

The post-war period was a period of idealism and hope. The Labor government, with a firm commitment to a socialist ideal, also inaugurated policies of large scale immigration, industrialisation and urbanisation. The aims, set out in a White Paper presented in 1945, were to achieve, among other things, a high and stable level of employment, rising standards of living for all people, the development of national resources, and the guarantee of security and of opportunity for the individual (Encel, 1971, p.11).

The results of the large scale immigration programme, and the subsequent "baby-boom" of both native born and immigrant Australians resulted in the excessive demands placed on the school system in the late fifties and into the sixties.

Apart from the numbers of pupils needed to be accommodated in schools from natural increases, a second factor contributing to the rise in school enrolments was the increasing tendency for pupils to remain longer at school. The abolition of middle school examinations, the increase from the mid-sixties in the school leaving age, and the introduction of greater independence and flexibility in the administrative structure of schools, especially in timetabling and hence in the range of subjects on offer, created a climate wherein students were more relaxed and encouraged to continue. New trends in school buildings reflected the changes taking place in secondary schools as they strove to provide for individual differences, abilities and interests (Fitzgerald,1970,pp.80-103).

The rationale for increased retention stemmed also from economic and social and cultural factors. From an economic viewpoint the expansion in the number of school attendees resulted from the never-ending process of occupational specialisation and diversification. The percentage of persons engaged in professional and related occupations doubled between 1947 and 1966 (Encel,1971,p.19). This increase in white collar employment, with a corresponding decrease in blue collar opportunities meant not only that parents now saw tertiary education as a natural progression to the professions, but that an increasing number of parents saw education as a means of social advancement for their children. The effect of these pressures is best reflected in the increases in tertiary enrolments throughout the sixties, both in universities and other tertiary institutions, which grew much faster than any other level of education. A significant statistic was the more rapid increase in enrolments in natural science courses throughout the fifties and sixties than in any other tertiary discipline.

The enormous expansion in the number of school attendees exerted overwhelming pressure on the State Departments of Education as they strove to cope with the problems of accommodation and staffing. In the period 1950 to 1968, secondary school enrolments rose by 273 percent in government schools, and by 173 percent in non-government schools (Fitzgerald,1970,p.8). Cope somehow they did, but only at the cost of a uniform curriculum and a lowering of teacher morale (Dow,1985,p.6).

Another factor was also having an effect. This, arising from the abolition of year 10/11 external examinations and the increase in the school leaving age resulted in the appearance, in the upper years of secondary schooling, of a group of students whose abilities and aspirations were at odds with the predominantly academic curriculum of the secondary school at the time.

The abolition of the Intermediate Certificate examination in 1967 provided a need and an opportunity to recast the secondary school curriculum for years 7 to 10. The emergence of a group of reformers within the Education Department (principally the Director-General, Mr Reed), the concern of the Victorian Secondary Teachers Association (VSTA) with professional issues, and the responsiveness of many teachers in the classroom, created a climate conducive to change.

A seminar, run by the Education Department in 1968 recommended to the Director-General that: there should be no external examinations; there should be no externally prescribed courses of study; teachers should be fully responsible for curricula; and the training of teachers might best be carried out in study areas rather than subject divisions.

In December 1968, the Director-General gave each school the right to determine its educational programme, based on these basic principles:

- * Secondary education ... should be considered a period of general non-specialist education.
- * Organisation should ... be flexible enough to permit varied grouping and, if necessary, easy abandonment of traditional subject categories.
- * The basic curriculum offered ... should embrace at least the Arts, Social Sciences, Mathematics and Physical Education. It is not supposed, however, that all or any of these need be offered as separate "disciplines" ...
- * There is no place for competitive assessment in secondary schools. There should be constant non-competitive assessment of individual development ...
- * Methods of teaching should encourage intellectual independence in students. Learning should be thought of as a co-operative, not an authoritarian, situation (VSTA, 1970, p.138).

The new Victorian curriculum was not subject-centred. It was aimed more at social development than at intellectual growth, it was designed to make school more attractive and socially effective for the lower ability pupil. It was the beginning of an era of School Based Curriculum Development (SBCD).

Post-Sputnik Nineteen Sixties

While these developments were occurring locally, overseas events were beginning to have an impact, especially in the science and mathematics areas. "Sputnik", 1957, is regularly mentioned in the same breath as "new maths", and as a symbol of the intellectual fervour of the times, it is no doubt expressive. But the feelings of disquiet with, and criticisms of, the mathematics curriculum were well in place by the time Sputnik made its first orbit. What this technological triumph of the Russians did, was to provide a stimulus to Americans (and others) concerned that their educational system was not serving adequately the needs of a technological society. It prompted the American government to provide funds for the advancement of education, especially in science and mathematics, and raised concerns with the quality of education throughout the Western World.

In 1959, a conference of scientists, scholars, and educationists met at Woods Hole on Cape Cod to discuss how education in science in primary and secondary schools might be improved. The report of this conference, compiled and presented by Jerome S. Bruner under the title *The Process of Education*, contained many of the ideas that were to have a substantial influence on educational thinking throughout the next decade and beyond. The ideas relating to curriculum were particularly relevant to the events affecting mathematics educators within Victoria.

Bruner maintained that a curriculum should be developed on four premises:

1. understanding fundamentals makes a subject more comprehensible;
2. human memory is unable to retain detailed information unless it is presented in a structured pattern;
3. understanding fundamental principles and ideas appears to be the main road to "transfer of training";
4. emphasis on structure and principles enables the gap between "advanced" knowledge and "elementary" knowledge to be narrowed by the constant re-examination of material (Bruner, 1977, pp.48-52).

New Maths Emerges

For Bruner, and the other participants, concern was for the quality and intellectual aims of education. The path to successful curriculum development was the employment of experts in their field whose grasp of the fundamentals could be brought to bear in illuminating the subject areas to be studied. It was to be an adult curriculum designed to develop adults (Bruner,1977,p.52) - a curriculum that would invoke the notions of discovery learning and the spiral curriculum, and, because of the emphasis on “structure”, would mark a shift away from a concern with content to a concern with technique.

On the continent of Europe, the work of Nicholas Bourbaki, a pseudonym for a group of (essentially) French mathematicians, was coming under notice. The motivation of Bourbaki, the systematisation and unification of mathematics using a set of underlying fundamental concepts - in part, operators, functions, topology, logic, sets and structures - struck a chord with those mathematicians looking for a renewal of the curriculum.

The work of Bourbaki and Bruner coalesced to provide a context for the development of a “new” mathematics curriculum in Victoria. Developed by a committee of the Mathematics Association of Victoria (MAV), and imposed through a uniform set of syllabi by the Victorian Universities Schools Examination Board (VUSEB), the “new maths” was introduced to Victorian secondary schools in the late sixties. This curriculum was prepared by a group of experts and adopted the ideas and terminology of Bourbaki. Much about these ideas and this terminology was new, not only to students and parents but to teachers as well. The new curriculum reinforced elitist notions of mathematics, it elevated the process above the content, and was expected to be taught by teachers in the schools, many of whom had no formal qualifications in mathematics, and who were struggling with the changes introduced into the schools by the Director-General. These changes ran counter to the mathematics thrust.

Is it any wonder that a commentator of this period could write - “Logical development of mathematical structure, reinforced by constant drill and divorced from intuition and observation, was to become the work of many of the ‘new mathematics’ programmes in practice” (McQualter,1980,p.72).

The Present

The nineteen eighties present a very different society and very different concerns for curriculum development. It is a society where status is not merely a question of birth or primordial ties, but of talent and ambition. It is a credentialed society, where qualifications and specialization enable people to climb to the higher levels of society. Nowhere is this more evident than in the professions; and the recent struggle by the nursing fraternity to establish a tertiary qualification as the sole means of entry to the "profession" illustrates this point graphically. Differential skills and differential incomes are now based on technical skills and higher education. In business we witness the growth of middle management replete with MBA, in government the recruitment by civil service and bureaucracy from the graduate population. Here as elsewhere, the conditions of success are enhanced qualifications.

In this scenario education becomes a defensive necessity. As Lester Thurow(1972,p.79) observes:

As the supply of educated labor increases, individuals find that they must improve their educational level simply to defend their current income positions. If they don't, others will and they will find their current job no longer open to them.

This is no less true of the teaching/lecturing profession! This scenario helps account for the enormous growth in the demand for post-graduate qualifications in recent years, and for the pressure to provide higher qualifications.

Qualifications are the means of entry to credential society, and hence the tertiary institutions have a quasi-monopoly in determining the future stratification of society. Thus it is not surprising that tertiary institutions come under scrutiny, especially if it is perceived that the privileges universities bestow follow traditional class lines. Social status may be attained in two alternative ways: by achievement either in education or in work, or by ascription. Australian society is viewed as one providing opportunities for individuals to increase their level of status through achievement, although those in positions of high status seek to pass on to their children opportunities for maintaining status through education and inherited wealth. A recent study found that in Australian society inequality is to a significant degree transmitted from one generation to the next. In addition the influence of family social status on schooling has remained largely unchanged over the past 50 years (Broom,1980). The abolition of fees did little to alter the socioeconomic composition of tertiary institutions, and this along with the increasing demands for credentials, highlighted the disparities that were present in the society (Anderson,1983).

Indeed, when the work of Jencks(1972) and others concluded that inequality is as prevalent within families as between different cultural backgrounds a new social policy was needed. This came in the form of equity - equality of result - rather than the liberal notion of equality of opportunity.

Recent Australian research demonstrates that socioeconomic effects have greater influence on continuation to year 12 than on performance in year 12 examinations (Rosier,1978). The Schools Commission (1980,p.4) drew attention to the fact that the distribution of educational opportunities by the social origins and personal traits of students is a persistent feature of the Australian system, thus posing the challenge to distribute the benefits of schooling more evenly. The Participation and Equity program (Commonwealth Schools Commission,1984) sought to reduce significantly the numbers of students who were prematurely departing from full-time education, and to foster more equal educational outcomes.

With Labor governments in Canberra and in Victoria throughout the eighties, this new social ethic took form. Policies of Participation and Equity, of Affirmative Action, of Multiculturalism and the like were put in place to redress the inequalities that were perceived to be prevalent in the society. With this shift in social concern came a shift in political perceptions - from the realization of individual ends to that of group and communal needs. Not only is this evident in policies initiated by the government but it can be seen in the wider spectrum through the "green" influence and the "quality of life" issues, such as the demotion of cigarettes, the promotion of exercise, and so on.

At the educational level this new emphasis has several consequences. At the tertiary level, universities are seen as holding the key to the future stratification of society. Hence they are no longer seen as "ivory towers" or "citadels of learning" but as institutions whose social purpose needs to be aligned with the social policy of the government.

The credentialled society is upon us, so action is necessary on this front. This takes two forms. One is to attack the notion of credentialism (Ashenden,1978,p.154). The other is to alter the educational system. The VCE reorganization is a part of the Victorian Government's social justice strategy that includes among its objectives the reduction of disadvantage caused by unequal access to economic resources and power. Education has a special role to play in this strategy for it is the most direct and sustained involvement by Government in the lives of all its citizens (State Board of Education,1988,p.37).

The Future

It is in this context that the mathematics curriculum has been developed. There is a single Mathematics study, consisting of four blocks of units, titled Space and Number (S&N), Reasoning and Data (R&D), Change and Approximation (C&A), and Extensions. Each of these blocks of units can be taken at either year 11 or year 12; Unit 1 and Unit 2 correspond to year 11, Unit 3 and Unit 4 to year 12. Three work requirements form the basis of work done in each unit, and these work requirements are one of the most significant features of the Mathematics study. They are titled Projects, Problem Solving and Modelling, and Skills Practice and Standard Applications. The Mathematics study has been described as unnecessarily complicated. The design was in response to the requirement that the wide diversity of courses already operating at years 11 and 12 should all be brought under the umbrella of the VCE. The intention was to offer each unit, within a school, across the whole spectrum of year 11 or year 12 students. "The FOSC was unable to find a way of developing a multi-study structure which achieved the goal of parity, particularly given the way in which different mathematics subjects and courses have been accorded such different status in the past" (VCAB,1990).

The agenda has been set by the Government through the implementation of the Blackburn report. The issues are to be equity and empowerment (Keeves,1986,pp.94-95). The debate is about inequality, not quality; about deprivation, not giftedness; about automatic progression and, where necessary, in the upper levels of secondary school, about teacher assessment rather than external assessment; about less assessment grades rather than more; about all 44 VCE subjects as the basis for admission to university, not 17 as proposed by a University; about process, not content.

In many ways the ideas underpinning the introduction of the Victorian Certificate of Education (VCE) are familiar. In the writings of Bruner, of Reed, of the VSTA we see the seeds of many of these ideas. In this case the new mathematics curriculum is being developed alongside those of the other subject areas, because this is a government initiative and hence centralised. But are the courses being developed in tune with the prevailing social ethic? And have the lessons of implementation from the past been learnt?

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