INTRODUCTION

Setting the Scene

The post-industrial society and the information society are terms which are becoming familiar as automation and computer systems play an increasingly important role in both developed and developing nations. In effect, they imply:

- a steady decline of manual and unskilled jobs;
- a steady rise of the servicing sector as the major employment area;
- a growing demand for people with technical and professional skills.

And the pace of change continues to increase. In New Zealand the Government’s market-driven policies have accelerated the decline of old industries and outmoded systems while new technologies are coming in at a faster and faster rate. Perhaps, most significantly, we are witnessing the change from mechanical and ‘doing’ skills to technical and ‘understanding’ skills. Hence the increasing importance of technician training. In presenting this paper I hope that the New Zealand experience may be of some assistance to others who are moving down the same path and, like us, have come rather late to a full appreciation of the importance of this occupational group.

New Zealand is a small country with a population of 3.3 million people which could be accommodated in Sydney. Australians may be tempted to suggest that many of them are there already! In this regard, it is perhaps pertinent to note the recent comments of the Australian Minister for Immigration (Ray 1988) who observed that “the youth and high mobility of the New Zealanders in the Australian workforce is a benefit to the economy" and that "they are twenty to twenty five percent more likely to have tertiary or trade qualifications than Australian citizens". And therein lies the rub, as these skills are a scare commodity that New Zealand can ill afford to lose. Compared with other OECD countries New Zealand already has only limited entry by school leavers to ‘middle group’ occupations (Tetley et al. 1986) and a low proportion of technicians in its workforce. International evidence suggests that the importance of adding value in a restructured economy exposed to market forces will increase the demand for such skilled workers. It is this concern that has prompted recent research by the Vocational Training Council.
Background

To understand the development of technician training in New Zealand one has first to understand something of the background to our economic and social development (Wood 1988a). Until Great Britain joined the European Economic Community in 1973 we were tied closely to the "mother country" by the bonds of tradition and trade. In return for duty-free and unrestricted access to the United Kingdom market for most of our agricultural exports, Britain obtained an assured source of reasonably priced food - in peace and in war - and valuable preferences in the sale of manufactured goods. With this guaranteed market for its primary produce - comprising over 80% of its exports - New Zealand, by 1950, ranked third on the international index of wealth maintained by the Organisation for Economic Co-operation and Development (OECD) having, like Australia, "ridden to prosperity on the sheep's back".

But, despite the dominance of British manufactured goods and the dependence on primary industries, there was also a small but growing manufacturing sector. With the large scale deployment of men into the armed forces during the Second World War an acute shortage of skilled technical workers developed. Previously, when faced with skill shortages, New Zealand had simply encouraged further immigration - mainly from the British Isles, as you would expect. However, the harsh reality of war brought both the immediate and the future problem of trade and higher technological training into a new focus and led to the first long-term planning for the introduction of comprehensive technical training.

Trade Training

Formal trade training came first. Although Acts of Parliament relating to apprentices date back to 1865, it was not until the passage of the Apprentices Act in 1948 that attendance at technical classes became compulsory for apprentices in most trades. At the same time a Trades Certification Board was established to conduct national examinations for apprentices. Although not compulsory these quickly became the standard trades qualifications with national and ultimately international recognition. In this regard New Zealand tradespeople enjoyed an advantage not shared by their Australian counterparts where, as late as 1974, the committee set up to advise on technical and further education reported that technical college awards had no universal recognition (Kangan 1974).

It was to be 35 years before the next major reform in trade training took place in New Zealand. Based on a detailed review of apprenticeship and recommendations for future policy by the Vocational Training Council a new Apprenticeship Act was passed in 1983. In addition to making the conditions relating to apprenticeship more flexible, by instituting joining and group apprenticeships and apprenticeships to industry, the Act opened the way for other major reforms. In particular, Government policy has forced a move away from "time served" towards "competencies acquired" as the basis for completion of apprenticeship contracts. Again the Vocational Training Council has played a major role through the development of training manuals and record books covering validated skills, identified initially through job and task analysis based on the DACUM approach. Papers by

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Adrienne Burleigh, the Council’s Assistant Director (Training Development) who has had responsibility in this area, explain the significance and main features of this work in greater detail (Burleigh 1984, 1987).

**Technical Training**

Given the infant state of our manufacturing industry at the end of World War II it is understandable that technician training developed more slowly. Indeed, as late as 1956, in an address to the Senate of the University of New Zealand, Dr C E Beeby, then Director of Education, said:

> New Zealand is backward in the provision of training for technicians and, indeed, in the very recognition of this most important category. We have, to be sure, occupations that would properly be classified under this heading, but the training we provide for them is often the sketchiest . . .

Not surprisingly, the first major development in technician training took place in the engineering industry where there was an emerging need for workers qualified to fill positions variously referred to as "engineers' assistants", "middle group engineers" or "technician engineers". The original five stage New Zealand Certificate in Engineering (NZCE), introduced in 1955 to meet the needs of the engineering industry, has now been the principal technician qualification in New Zealand for over 30 years - also with international recognition. Today New Zealand Certificates are available in a host of other engineering, building, science and commerce disciplines covering a much wider range of occupations, many of which might well have originally been regarded as outside the legitimate sphere of a "technician" qualification.

**Technical Education**

By definition, the training of technicians is dependent on an effective system of post-compulsory education between the secondary school and the university - frequently termed technical education. In New Zealand technical day schools began to develop from the turn of the century - mainly in association with the evening classes that had sprung up for adults during the nineteenth century. Again it was the impetus of the war and the foresight of Beeby which brought the next major development. In the Commission on Apprenticeship and Technical Education set up in 1944 he saw the potential of technical colleges to provide the training necessary to meet the needs of increasing industrialisation and higher levels of skill. With the raising of the school leaving age to 15 imminent, Beeby saw the need to separate such training from existing technical schools.

Beginning with the establishment, in 1946, of the Technical Correspondence School (later to become the Institute) the foundations of the technical institute system were laid during the immediate post-war decade. With the appointment of Dr Bernard Lee as the first Director of Technical Education in 1956 progress was rapid. In the main centres new institutes emerged from the long-established technical colleges and the senior technical divisions of secondary schools. The Central Institute of Technology was established as a national entity in 1960 and a network of technical institutes and community colleges spread progressively across the country so that today...
there is a polytechnic (as they are now called) in almost every major provincial town in New Zealand.

Summary

During the last 40 years New Zealand has developed its system of technical and further education in parallel with the emergence of trade and technician qualifications and authorities which ensure national acceptability and portability. Currently, as a result of a series of major reports culminating in the Report on Post Compulsory Education and Training (Hawke 1988), the Government is introducing further major reforms designed "to secure effective funding and management systems while ensuring equity in both access and process". An essential feature of teaching institutions who will ultimately be required to purchase advisory services previously provided through central Government agencies. Within this overall scenario the Vocational Training Council has, for the past two years, been working with industry to identify the generic job competencies required and to make recommendations concerning an increased supply of technicians and improved on-job training.

In the remainder of this paper I propose:-

. To consider developments in technician training in recent years;
. To discuss the VTC study and identify its outcomes; and
. To identify and discuss the issues confronting technician training in New Zealand.

RECENT DEVELOPMENTS IN TECHNICIAN TRAINING

The Starting Point

The scene for growth had been set by the start of the seventies. A Technicians Certification Authority (TeA) has been established in 1960 and the foundations of a national system of technical institutions had been laid. But there were many problems to be addressed (if not resolved) which were only beginning to be understood at this time.

In 1971 a national study conference on technician training, sponsored jointly by the Vocational Training Council and Massey University (Miller 1971), considered the emerging needs of various sectors of the economy in a forum designed to identify problems and suggest solutions. From the outset the conference recognised the difficulty of defining "technicians" because the contexts in which they work are many and varied. However, it was generally agreed that there was a need for full consultation within an industry to determine the type of person needed, the type and level of training required and the likely future demand for those skills.

Another problem which was also identified in 1971 and has persisted throughout the intervening years was the need for a clearer definition of the industry-based training needed in producing a qualified technician. Other problems identified which have been addressed progressively, if not systematically, included the need for wider publicity of educational and
employment opportunities for technicians and the need for more "bridges" between technician and university qualifications.

Who are the Technicians?

It is over 30 years since Popper (1952, p. 21) suggested that an attempt to define the term "technicians" would not be profitable and "may lead to a good deal of hair splitting". Nonetheless, without the establishment of reasonable boundaries to "technician" activities, it is difficult, if not impossible, to develop appropriate systematic training. In seeking to establish these parameters in New Zealand, Offenberger (1979, p. 5) has made it clear that the traditional concept of three-tier structure of technologists, technicians and tradespeople does not apply. He identified that, as long ago as 1970, less than half of the holders of New Zealand Certificates fitted within this structure and argued that technicians as a group of workers should be classified in looser and more general terms.

The segment of the workforce that this term covers is a rapidly changing one and now includes a wider variety of occupations. In general terms it encompasses people who would usually have qualifications different from the "professional" (or university) level but in advance of the trade (or equivalent) level. In terms of their activities they have been described by UNESCO, the British Technician Education Council (TEC 1980), and other authorities as "a broad band of personnel who have certain features in common: they have to exercise technical judgement, understand the principles underlying their work and the purpose of what they are doing and often supervise other staff". For the sake of brevity I will use "technician" as an all inclusive term throughout this paper to cover this middle group of occupations.

Recognition

In spite of the recognition given to these "middle group" occupations by the establishment of a certification authority (TCA), they failed to gain the same support from industry that had been accorded to apprenticeship. In 1967 the Technician Training Act permitted the setting up of technician training councils to parallel the well-established national apprenticeship committees. However, there was little interest from industry, with the only developments being for building and dental technicians. The failure of industry to take this early opportunity to establish and oversee the on-job training it required for this emerging occupational group is understandable. But the consequences have meant a continuing difficulty in employers being able to identify both the importance to their enterprises and the training needs of this increasingly diverse group.

Given the diversity of technician occupations the task of developing suitable qualifications has also not been easy. The principal functions of the Technicians Certification Authority were to prescribe courses and syllabuses, to conduct examinations, and to issue certificates or diplomas to those who successfully completed the prescribed courses. In recognition of the expanding requirement for "middle group" qualifications the TCA was reconstituted in 1979 as the Authority for Advanced Vocational Awards (AAVA). A unique and extremely significant feature of the functions of the new Authority was its validating role. In recent years the establishment of
the NZ Certificate as a benchmark has opened the way for the development and introduction of a number of related qualifications, some internally assessed in teaching institutions, which have helped to meet the diverse qualification requirements of the technician workforce.

In establishing its qualifications the Authority has sought to identify the essential difference between university education, with the objective of developing a student's thought processes, and technician education which aims to develop students to be able to apply knowledge to a variety of environments in order to solve problems. Thus AAVA has seen the challenge to produce programs and qualifications that are not "less than" but rather "different from" university degrees. Because of their applied nature they are potentially of greater immediate value to employers in many work situations. The recent expansion of the Authority to include representatives of the Employers Federation and the Council of Trade Unions is an important recognition of the need to ensure that this objective is achieved and should assist in further enhancing the credibility of NZ Diplomas and Certificates in industry.

**Industry-based Training**

In New Zealand all trades and many professions have always required a practical, work-based component of formal training programs. Similarly, since the establishment of the New Zealand Certificates in 1955 there has always been a requirement for work experience in technician training. Describing the position of AAVA on this the former Director (Imrie 1987a) said:

> For technician competency, vocational study and the passing of examinations should be complemented by work experience. It is the Authority's view that, for each student, suitable work experience provides the vital and individual context for effective study of vocational subjects and for the development of appropriate attitudes and understandings.

This is in marked contrast to the position described at the 1971 technician conference by R.F. Thomas (1971, p. 40). In speaking of the training of technicians in the NZ State Services (then the largest employer of this occupational group), and the frequent lack of systematic on-the-job training, he commented that:

> A formal qualification, even a more or less practically-based one like NZ Certificates, may be regarded as an indication of the level of work of which the holder is capable. Without adequate work-based training, trainees may never be in a position to return to their employer the benefits bestowed by their education. When this happens employers may be tempted to brand the Certificates as unnecessarily theoretical and not worth the expense involved in allowing staff to study for them.

The intervening years saw some important developments concerning the vexed question of "suitable work experience" as the Authority sought to overcome the deficiencies highlighted by Thomas. The major initiative was the introduction, in 1984, of a work experience record book which provided a
much more comprehensive description of the type of activities undertaken during the required three year period of work experience that was previously available. Growing pressure to increase access to training opportunities and difficulties in finding suitable work placements in the extremely tight labour market of the 1980s led AAVA to develop an alternative path to the NZ Certificate by the removal of the requirement for previous or concurrent work experience. As a result, since 1987, it has been possible for the required work experience to be gained after the formal training program has finished, through the completion of a suitable work-based project. However, only a small number of students have so far taken advantage of this relaxation of requirements.

More recently, the Government's concern at the lack of training placements available in industry has led to the establishment of two-year full-time pilot courses in polytechnics (covering the same field as the AAVA Certificates). This concept has proved extremely popular with the polytechnics, with the Authority having received some 30 submissions to establish such programs in the last two years. But lack of adequate consultation with AAVA and the labour market partners has produced considerable tensions and unresolved industrial relations issues regarding the level of equivalence that will be recognised by the Authority and the industry - the ultimate arbiter in such matters. In an attempt to overcome some of these difficulties the Engineering Industry Training Board is currently endeavouring to produce a list of tasks to be performed on-the-job by those who graduate from the pilot courses in order to qualify for the new national certificate. The development of such full-time institution-based courses with the opportunity for greater academic depth but restricted opportunities for practical and industry-based training emphasises the importance of the validating role of AAVA in ensuring the acceptability to industry of the resultant qualifications.

Considerable progress has been made in the reform of apprenticeship and the move towards competency-based training based on the task and job analysis work of the Vocational Training Council, but progress in the technician field has been much slower. Whereas the formal nature of apprenticeship contracts requires a commitment from employers to train, there is no such requirement in the training of technicians. However, where the DACUM approach to technician job and task analysis has been used as a basis for curriculum development, promising progress has been made. A growing number of major employers are now recognising the potential of this approach for the design of technician training.

**Educational and Employment Opportunities**

The 1971 Conference recognised the need for an improved vocational guidance service in schools to make young people more aware of career opportunities in the technician field. This process was assisted during the 1970's by the appointment of guidance counsellors in secondary schools and of liaison tutors in the technical institutes, with a major responsibility to work with guidance staff and students in secondary schools. During the eighties, as equity issues have become more prominent, additional tutors with specific responsibilities for women, Maoris and Pacific Island people have been appointed in many polytechnics with some quite marked success in encouraging these groups into technician occupations in which they have traditionally been under-represented.
In 1978 the vocational Guidance Service was transferred from the Department of Education to the Department of Labour to give it a sharper labour market focus. Now, 10 years later, it is likely that the wheel will turn full circle and that this service will become part of the proposed new Ministry of Education to be established in October 1989. During the past 10 years the Vocational Training Council has contributed to vocational guidance in a significant way through the work of its specialist committees. In the early 1980s it published a series of personal profiles of women in 40 non-traditional occupations, many of which belong in the technician group as defined earlier in this paper.

More recently the Council's careers kits on women in engineering, jobs in computing, and its video, The Last Entry, have been well received and popular in secondary schools. But, as Figure 1 shows, much remains to be done to correct the gender imbalance.

The skills shortage is also a concern. In a recent research report (Tarrant 1986), concern was expressed as to "whether we have the capability to generate the technological skills clearly needed to develop an economy which, under the realities of a changed world economy, can support both the material living standards to which we have become accustomed and the social and welfare goals we see as desirable".

The report highlighted the failure, in the past decade, of the servicing sector - where most technicians are employed - to absorb the increase in the labour force while, at the same time, unemployment increased, job vacancies grew and overseas recruitment for specialist skills continued. It pointed to the need to ensure that an adequate hierarchy of technological skills is produced and to the importance of co-operation with Australia to heed the problems perceived as common to the Closer Economic Relations (CER) region.

Imrie et al. (1985) have shown that, for a modest 3% growth of research and development - essential for our future economic growth and prosperity - the number of technicians qualifying in 1983 would have to increase by a factor of 2.5 by the year 2000. Given declining enrolments in the entry cohorts of our secondary schools and the current situation whereby the annual generation of technology-related qualifications represents only 7% of school leavers or, more starkly, only 0.4% of the total labour force, the cause for concern is clear and the need to promote career opportunities in the technician field is apparent (Walsh 1986). Figure 2 highlights the seriousness of the position.

Building Bridges

Many modern writers stress the importance of upward mobility in the workforce and authors such as Peters and Waterman (1982) point to the success of firms who encourage the initiative and promote the career development of their staff. Some opportunities for such vertical mobility already exist in New Zealand. For instance, in certain circumstances, it is possible for an apprentice to commence part-time study for a NZ Certificate and continue trade and technician training concurrently. Provided the latter qualification is completed with high grades such a technician is eligible for
TECHNICIANS
BY GENDER

MALES 77.0%
FEMALES 23.0%

FIGURE 1

FLOW OF STUDENTS FROM FORM 5
TO TECHNOLOGICAL QUALIFICATIONS

(1) 72.0%
(2) 14.0%
(3) 7.0%
(4) 4.0%
(5) 3.0%

(1) WORK AND/OR TRAINING
(2) REPEAT FORM 5
(3) OTHER DEGREES
(4) TECHNOLOGY BASED DEGREES
(5) TECHNOLOGY CERTIFICATES

FIGURE 2
direct entry to the second professional year of, for instance, an engineering
degree course which can then be completed in two years of full-time study
instead of the usual four. The success rate of such students is well
established and each year places are reserved for them in university schools
of engineering. However, with the exception of engineering where the NZCE
is highly valued in industry, it would be true to say that the linkages that
have been established between the trades and technician levels are currently
much better developed than those between technician and university
qualifications. In the latter case the universities generally demonstrate a
continuing reticence in other than their own environment.

The need for such flexibility has been recognised in Australia by the metal
trades group of unions who have well-developed proposals for major reform
to the skill development and training arrangements applicable to their
industry. These include the introduction of career paths to link operator to
professional levels, which will enable trades workers to progress to technician
and ultimately to professional level by completing appropriate units of
education and training (Sweet 1987). While acknowledging the importance of
such arrangements, the New Zealand Authority for Advanced Vocational
Awards (AAVA) places a higher emphasis on developments in the area of
technician training. To quote Imrie again (1984), "The principal objective of
technical education is to equip technicians with a broad portable
qualification which will provide an adequate foundation for change of
occupation and the ability to learn from experience".

As a consequence of the recent reviews of secondary and tertiary education
the government has indicated an intention to replace the many present
examining authorities with a National Education Qualifications Authority to
deal with secondary, vocational and academic qualifications and awards.
The intention of those who have promoted this concept has been to improve
the present provisions for "staircasing" or bridging between different but
related qualifications. Hopefully, this initiative will ultimately make such
progressions the normal feature of career development instead of the
exceptions that they currently tend to be. Hopefully, also, this will have the
effect of encouraging many who have acquired initial skills in practical areas
to build a new theoretical understanding on this foundation and so move
into the important technician field of employment.

Summary

In a succinct summary of developments - or rather lack of them - in
technician training during this period Imrie (1987b), in a paper presented to
the Institution of Professional Engineers, stated "Current problems therefore,
relate to years of neglect, lack of awareness and an absence of policy co­
ordination by employers, government and the technical institute system,
essential for development of the appropriate quantity and quality of
technicians for the future".

It is against this background that the Vocational Training Council undertook
its study of technician employment and training during 1987 and 1988.
THE VOCATIONAL TRAINING COUNCIL PROJECT

Objectives

The purpose of the project was to establish a foundation for future developments in technician training. To provide this, four principal objectives were identified.

It was first necessary to determine the present distribution of technicians according to sector of industry, geographical region and size of establishment to provide a baseline against which to compare future changes.

The second requirement was to obtain information about the range of activities carried out by technicians in their jobs and the skills and knowledge required.

A third and critical factor was the need to chart the mobility of technicians and to seek information about career paths as both of these factors have implications for training and retraining.

Finally, it was necessary to establish the pre-entry education and training background of technicians and to identify changing trends which could affect recruitment and training in the future.

Base Data

The five-yearly New Zealand general census of population held in March 1986 provided appropriate base data for the study. Information on qualifications, employment sector, geographic location and other variables was obtained. But an immediate difficulty arose in respect to classification of the workforce in terms of occupations. The NZ Census uses the international standard which dates from just after World War II, although minor revisions have been made since. This base proved most unsuitable as more than half the technician workforce appeared under just two of twelve categories: Electrical/Electronic and technical and other related workers. Since whole sectors of sunrise industries (e.g. computers and information technology) were not in existence in 1946, the required discriminators could not be obtained under this classification. Although I believe there is a major revision now under way, international agreement on change takes some time.

Fortunately, another classification devised by AAVA was readily available. This addressed the emergence of technological and middle group occupations and fitted comfortably with the definition of technician adopted in this paper. Using this 18-category classification we targeted all employers of technicians in the total workforce - in excess of 1,100 companies in all.

From the 40% of companies or organisations responding, the workforce analysed comprised 89,017 of whom 6,802 were technicians. This percentage of technicians approximated that in the total labour force. During 1988, one-third of the responding companies had follow-up interviews to clarify issues identified.
I should add that the project took place against a massive restructuring of the NZ economy - the greatest upheaval since World War II. Responses from companies revealed the effects of this new hard-nosed environment and sharpened the issues which surfaced.

I shall have insufficient time in this address to deal with individual employment sectors except in general terms. However, individual sectors and their variations are described in more detail in the Council's research project, *Technicians for the Nineties*, authored by Bryan Whisker (Whisker 1989), its Chief Advisory Officer (Training Development).

I wish to emphasise that this was an industry survey and the response called for was from employers. Although providers have the responsibility for a partnership in the delivery of training, the NZ Vocational Training Council has consistently held the view that the major responsibility for defining needs rests with industry and not with providers (Burleigh 1984). While I am aware that providers do not always agree with this approach, I referred earlier to the problems that can arise when this principle is not followed.

Outcomes

In relation to distribution of technicians the survey confirmed the growing dominance of the Auckland region. There has been an accelerated transfer of the workforce to Auckland in recent years and technicians are no exception. The bulk of the manufacturing base, which has contracted sharply with Government free-market policies and shed more than 20,000 jobs nationally in the past year, now centres on Auckland.

Although shortages of technicians had begun to show up in New Zealand around 1985 these have been concealed over the past three years through the redundancies that have followed the restructuring and contraction of the manufacturing sector. However, the survey showed that shortages were again beginning to emerge in Auckland and, by the end of 1988, there was evidence of shortages elsewhere. When the economy lifts further, severe shortages are likely to appear very quickly. Currently they are most apparent in the rapidly expanding and highly volatile data processing sector in which 24% of those employed are classed as technicians (comprising 8.5% of the total NZ technician workforce).

In international terms most companies in New Zealand are small, having less than 500 employees. The bulk of the private sector technician employees would find themselves working with quite small teams of individuals with qualifications similar to their own. In this situation it is not surprising that we found that technicians are required to undertake a wide range of activities.

From the current study the most important skills and knowledge required of a modern technician, as seen by employers, are the ability to co-operate with people and work as a member of a team (94% response as "very important") and the ability to communicate information to others (85% response as "very important"). Ability in practical technical skill rated a 72% response followed by organising and planning skills 70%. With only a 37% response, supervision skills ranked bottom of employers' requirements.
One unexpected result was the emerging emphasis in some sectors of the economy on legal expertise - at least to the extent of a realisation of what not to do and when to seek legal assistance in a more complex commercial environment. Although a direct comparison is not possible, it is significant to note that Offenberger's technicians a decade earlier had required a different balance of skills (Offenberger 1979) with greater emphasis on diagnostic skill and design ability.

Our study clearly revealed the strong mobility of the technician group within the workforce. This was not only from company to company (60% of the workforce had worked for one employer for less than 5 years), but within the company as well. Mobility into positions of management or supervision is also rapid, where initial "technical" skills are required in an interpretive rather than an operational capacity. Our research indicated that, in the last five years, over half of the total technician workforce in the sample had moved in this way. The rapid move into management raises quite urgent questions as regards pre-entry training and certainly retraining requirements. Figure 3 summarises the most significant mobility information elicited in the survey. It would appear that further information about the career paths of the technician workforce is necessary to provide for this.

The changing and expanding range of activities required of technicians, their high level of mobility and an understanding of their career paths are important factors to consider in relation to pre-entry training and trends concerning recruitment and further training needs. From our survey we found that 21% of the technician workforce have university qualifications and that half of the existing workforce of technicians had either trade qualifications on the one hand, or university qualifications on the other. This compares with only 43% who have entered employment with AAVA qualifications via the polytechnic system. The remainder have either no formal training or have overseas qualifications. But irrespective of the source of initial institutional training, 75% of employers expressed approval both with the standard of new recruits and also with the balance of training between theory and practice.

Another related factor is the changing role of the State which has been a dominant force in the NZ training scene since World War II. This has been the case at every level (trade, technician and professional) but, under present Government policy, the position has now changed. As Figure 4 shows, our study revealed that over half of the total technician workforce had received their initial training within the state sector.

But, with the conversion of former Government departments who were major training providers (such as, for instance, the Post Office, Electricity Department and the Ministry of Works) to State-Owned Enterprises (SOEs) like Telecom, Electrocorp and Works Corporation, the scene is now very different. They are legal entities in their own right and, in the new user-pays commercial environment in which they must operate, they own their own resources and raise funds in the market in the same way as private companies. The only major difference is that the Government is the sole shareholder - but it still expects a profit! Understandably, the practice of training "surplus to requirements", in anticipation of heavy losses to the private sector, has stopped.
MOBILITY & CAREER PATHS
1. EXPECTED RETENTION

3 TO 6 YEARS
27.0%

1 TO 3 YEARS
16.0%

UNDER 1
2.0%

OVER 5 YEARS
63.0%

MOBILITY & CAREER PATHS
2. ACTUAL RETENTION

1 TO 3 YEARS
21.4%

UNDER 1
19.0%

3 TO 6
20.2%

OVER 5 YEARS
39.0%

MOBILITY & CAREER PATHS
3. CHANGES IN 5 YEARS

CHANGED STATUS
64.0%

STILL TECHNICIAN
36.0%

MOBILITY & CAREER PATHS
4. INTO MANAGEMENT

WITHIN COMPANY
47.0%

OTHER
5.0%

OUTSIDE
30.0%

BOTH
10.0%

FIGURE 3

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However, almost 80% of respondents were either not aware of this change of policy or were choosing to adopt a "wait and see" approach. In either case, failure to act now by private sector employers who have traditionally recruited from the state sector, will have potentially serious consequences for the ongoing supply of technicians in an expanding economy as it responds to Government economic policy.

These changing trends, which could affect recruitment and training in the future, point to a number of issues that need attention. These will be the subject of the final section of this address.

THE ISSUES

From the work and research undertaken in New Zealand in the field of technician training in recent years a number of significant issues have emerged. These will need to be addressed if we are to be able to take full advantage of the anticipated economic upturn and to exploit the potential of new technology.

They relate in particular to:

- the question of supply and demand;
- the variations in sector growth;
- the changing skills required of the technician workforce and the implications for pre-entry training; and
- the most appropriate delivery systems for ongoing training and retraining, both on- and off-the-job.

I will examine each of these in turn.

Supply and Demand

Through his detailed analysis of the employment and training of technicians Whisker (1989) has established a sound baseline covering 18 sectors of industry and commerce, from which changing future requirements can be identified. For this to be of real value, regular up-dating will be necessary. His work, and that of Imrie (op. cit.), emphasise the importance of collecting appropriate information if trends are to be correctly identified. Modern sampling techniques could be used to establish a number of "indicator" industries covering both the range and number of technicians employed. If co-ordinated nationally, the database could be updated annually at minimal cost. In addition, under CER, it is important to both Australia and New Zealand to monitor the two-way movement of the skilled workforce across the Tasman. Currently, for instance, we have no reliable estimate of the number of skilled young New Zealanders who are assisting the growth of the Australian economy. A common labour market is rapidly becoming a reality and it will be important to establish common educational relationships if our common economic relationship is to prosper. The technician workforce will be a central and vital component in this exercise.
The information technology sector provides a classic example of the impossibility of developing appropriate training programs in the absence of precise information. Prior to the work of Jackson (1983) and Wagner (1984) an outmoded occupational classification system prevented the accurate identification of skill shortages in this burgeoning employment sector. The database established from their work provided the springboard for further developments. The next stage was the application, by Burleigh, of the cost- and time-effective DACUM process of job and task analysis to key occupations in this sector. This material was then used by a task force drawn from industry in both the public and private sectors as well as providers of training to develop and validate relevant and integrated on- and off-the-job training tied to a nationally-validated award. The secondment, by the Department of Education, of the task force convenor (an experienced head of department) as an 'energiser' quickly secured the support of the polytechnics and, to the amazement of those accustomed to the slow progress of traditional syllabus and curriculum reform, the new certificate in business computing was developed within 15 months - with an advanced certificate ready for introduction 12 months later at the start of 1989. The potential of this approach for application to other sectors in the technician field is now being realised.

In addition to a sound database such as this, another critical supply and demand factor is adequate two-way communication between industry (that has identified a need or a trend) and the potential workforce - especially those still at school who need clear signals as to likely employment prospects. In late 1988 the Royal New Zealand Air Force indicated that despite visits to schools by its recruitment officers, it expected to recruit only half of its required 85 avionics technicians. At the same time, in the adult labour market, the Comalco aluminium smelter at Bluff reported that it would need to recruit technicians from overseas. When such major employers of technicians make these comments it is clear that, despite the initiatives described earlier in this paper, there is still a major communication dislocation to be resolved. The limited interest of senior or secondary school students in technician-type careers identified in Project Fast (1988) was further confirmation of a serious communication gap.

Another essential prerequisite to ensure that supply and demand is in balance is the recognition by employers of their training responsibilities. As discussed earlier, the impact of the withdrawal by SOEs from the former Government department practice of additional training in anticipation of losses to the private sector has hardly been felt as yet. While, in the short-term, it may be offset to some extent by the return of well qualified young New Zealanders from overseas, it is more likely to be accentuated by the lead time required for training. Furthermore, present policy directions, which discourage centralised interventions in favour of the operation of market forces make it increasingly difficult to determine requirements on a national scale. For instance, under the former Ministry of Works, technician trainees were rotated through different divisions to gain work experience towards a NZ Certificate in Engineering. Approximately 100 per year studied the highway option of the AAVA course and entered the industry as roading technicians for the Ministry or for local government authorities. Under the new structures the responsibility for recruitment is no longer centralised. The National Roads Board, although not specifically charged with this responsibility and itself under threat of disestablishment, is the only national
body in a position to fill the vacuum for the industry as a whole. With no active recruitment in 1988, and with local government restructuring in 1989 likely to concentrate on redeployment of present workers rather than new recruitment, there is a likelihood of a shortage of technicians in the 1990s unless urgent remedial action takes place.

Thus we face the double dilemma of needing to encourage young people to undertake training in career areas where there are currently no guarantees of employment knowing that, if we don't, we are likely to face serious short-term skill shortages with the consequent inflationary pressure which this will create in the area of wage bargaining. Further clear evidence of this problem in practice was provided by the total lack of any enrolments for 1989 at the Central Institute of Technology for a new national certificate for industry (manufacturing) developed in consultation with an industry advisory group. Although there is an anticipated demand for such technicians two years hence, the current negative image of the manufacturing sector was no doubt the over-riding factor in student decision-making.

The supply and demand picture is further complicated by demographic and economic factors. The aging of the workforce is being accompanied by a corresponding decline in the population cohort that will be leaving the school system during the next two decades, although this may be offset, initially at least, by the increased retention rates in the upper secondary school. The Government's recently announced income support package for young people will also make tertiary study a more attractive option than the unemployment benefit. In these circumstances, with indications that the polytechnics are likely to adopt a strong marketing approach to compete with the universities in the school-leaver market, the supply of technicians could well increase. But this may be counterbalanced by an increasing tendency to employ graduates as technicians as shown in the Council's survey (Whisker 1989). It is against these conflicting trends and developments and continuing economic uncertainty that Government policy decisions, business investment decisions and the career choice decisions of our young people have to be made.

Variations of Sector Growth

In his best-selling prediction of future developments, John Naisbitt (1982) said, "It's becoming clear that yesterday is over, and as the Third World prepares to take over the major industrial tasks, the developed countries must move on to the new enterprises". New Zealand is currently in what he describes as the "dual economy" phase, with both sunrise industries and sunset industries, and consequent confusion in analysing our economic situation. An application to our present situation of Naisbitt's hypothesis that "we lose all intelligence by averaging" supports the theory of rising and declining industries. Thus, although the employment statistics for September 1988 indicated that, on average, 9.6% of the national labour force was unemployed, the real picture was quite different. In areas such as greater Auckland and greater Wellington, where new information-based and service industries were emerging, unemployment (by district) ranged from 2.2% to 6.4%. But, in areas where freezing works and other primary processing industries had been closed or restructured (such as the Hawkes Bay), or the rural economy was stagnating (such as Northland), unemployment had reached as high as 13.7% and 16.4%.
Put in the starkest terms, as identified by Naisbitt, New Zealand has the option of becoming a developed country or of joining the Third World. To achieve the former, the issue of the training requirements of the emergent sunrise industries must be addressed as a matter of urgency. The consequences of not doing so will be a continued rise in unemployment as our inability to compete with the Third World nations in industrial tasks has already been shown since the removal of protection for local industries. An adequate supply of technicians for these new industries will be crucial for our success.

**Pre-entry Training**

The changing skill requirements and the mobility of technicians identified in the survey, their steady movement into management and the increasing "user friendliness" of new technology all combine to raise questions about the appropriateness for the future of present pre-entry training, despite apparent current employer satisfaction. The Hon. Russell Marshall (1984) identified this problem in his address to the Economic Summit Conference when he stated:

*The system of tertiary education and training should have more of an anticipatory role by providing forms of education and training that will provide trained men and women who can match the job requirements of a changing economy. The emphasis in such education and training must necessarily be on the development of broad-based generalisable skills and abilities which can be built upon at a later date.* (para 4)

It is significant, for instance, that one in five technicians has a university qualification and yet university courses are not primarily directed towards technician employment. However, the employment scene is a contributing factor in this. A young university graduate, say in engineering, will accept a position as a technician within a company in the hope that some time in the future there will be the possibility of a move into professional engineering work. A job at the technician level looks good if it is the only job available. But given the larger numbers who choose this course, further research is necessary on the appropriateness of present initial training.

Evidence of this problem surfaced in late 1988 when Waikato University found that science graduates were having difficulty in gaining employment that was commensurate with their qualifications. While, on the one hand, there would appear to be an oversupply of science graduates, employers of science technicians point out, on the other, that, since the reduced intake of Government trainees, there are few job seekers available with a NZ Certificate of Science. Moreover, they consider that science graduates are often not temperamentally suited to technician work as they not only have higher expectations and may be reluctant to stay, but also their skills do not match the job requirements and there is a concern as to whether they will perform satisfactorily.

It is also significant that supervision skills were not highly rated as requirements by employers and yet many technicians move into management. Should such skills and other broad management and instructional skills be required in pre-entry training in the future? How else,
it could be asked, are technicians to acquire the human relations skills that are seen to be so important?

It now seems apparent that changing technology will involve forces moving towards de-skilling on the one hand, and multi-skilling on the other. Overseas research (Johnston 1987) suggests that workforce flexibility requirements will almost certainly demand a higher base level of education - especially in fast-growing occupations where there will be the greatest need of technicians. The boundary between technician and professional levels of qualifications is also likely to become more blurred as the concept of 'staircasing' or 'bridging' becomes more widely recognised and accepted. In these circumstances, initial training, up-skilling and retraining will all have a critical role to play in ensuring an ongoing provision of an adequately skilled technician workforce.

Ongoing Training and Retraining

While on the one hand the Government is currently promoting alternative training paths and experimenting with a new institution-based approach to pre-entry technician training, on the other the ongoing training and retraining of adults has assumed a new significance. In this regard, modular and open or distance learning may well appeal to management as a flexible tool to enable industry and commerce rapidly to update the skills of their present employees. New Zealand has a provider structure capable of meeting this challenge provided that a new era of co-operation develops between the national Technical Correspondence Institute, the Central Institute of Technology and the 22 regional polytechnics. In an earlier paper (Wood 1988b) I proposed a strategy that would allow New Zealand to take full advantage of overseas developments in the field of open and distance learning.

Just as much of the initial thrust of the Manpower Services Commission's Open Tech project was directed at the technician workforce in the United Kingdom so, too, is there an urgent need to undertake a similar initiative in New Zealand. As Figure 5 demonstrates, technician retraining is an ongoing requirement. Unless we are to resort to large scale immigration or to wait through the long lead time of initial training, the only way open to us to close the skills gap is through up-skilling the present adult workforce. It will be too late for providers to plan for this when industry finally recognises the need. They must prepare NOW.

But it will be most unfortunate if they have to prepare on their own. The Vocational Training Council's experience with apprenticeship reform has shown the benefits of co-operation between industry and providers in a structured setting in which the role and responsibility of each is recognised. A similar partnership is essential if the urgent training needs of the technician workforce are to be identified and provided for as a foundation for the enlarged economy and renewed prosperity which is the aim of current Government policy.

CONCLUSION

From the outset the difficulty of identifying the technician workforce in a way that is easily understood by employers has been understood. And yet, in a
deregulated economy, their very diversity may turn out to be a strength that needs to be recognised by employers. Adaptability, flexibility, mobility and good interpersonal and communication skills are likely to be key attributes in the workforce of the future. These are characteristics of technicians which training programs will need to concentrate on developing. Furthermore, they are traits that employers can appreciate - and ones on which they should be able to place a value.

But the urgency of the need does not yet appear to have been recognised either by Government or by employers. Nor, for that matter, have school leavers appreciated the career opportunities that technician training offers in a wide range of fields. There is obviously a major marketing and publicity task ahead of us. 1989 may well be a critical year for technician training in New Zealand. The effects of Government policy in economic restructuring should begin to be apparent in the creation of new jobs. A supportive and pro-active education and training environment will be essential.

But the impact of the devolution of educational administration envisaged by Picot (1988) and Hawke (1988), both in the schools and in the post-compulsory field, may well cause considerable initial confusion and uncertainty. In *Learning for Life* (Lange and Goff 1989) the Government has recently published its decisions on future developments in post-compulsory education and training. Unfortunately, the time lag that will occur between the dismantling of present structures and the establishment of new ones
seems likely to create a dangerous hiatus in which the ability of providers to respond to industry needs may be restricted. While the decentralisation of training delivery should make it more responsive to local needs, the requirement for centralised co-ordination of planning to meet national goals and to maintain portability of qualifications will remain. It is proposed that the new Ministry of Education will take the central role in policy formation.

It is a matter for real concern that neither Professor Hawke nor the Government appears to have appreciated the importance of involving industry and commerce as full partners in this matter. In no area will this need for co-operation be more critical than in technician training. The need to achieve it may well be the most critical challenge that faces technician education and training in New Zealand in the immediate future.

REFERENCES


