Engineering Qualifications designed for the new millennium

INTRODUCTION

Government initiatives to reform education and training has led to the Industry Training Act July 1992. In order to evaluate the success of the initiative, reference has to be made to the fundamental qualities captured in the Act. They are as follows:

1. Industry itself takes the lead in designing, managing and delivering training.

2. New Zealand develops a training culture in which ongoing training is seen as an integral part of working life and an essential characteristic of every successful business.

3. The best features of the present training systems are retained and built upon.

4. The quality, relevance and overall amount of industry related training in New Zealand increases.

5. Systematic, quality training is extended to industries and occupations which have not previously had any formal training.

6. All government supported industry level training is linked to a National Standards based qualification system, so that qualifications are portable, comparable and easily understood.

7. Training is accessible to everyone who needs it, especially to groups who have been under-represented in previous training programmes.

8. There is a diversity of type and methods of training with more than one way of obtaining a particular qualification or set of skills.

To address the question often asked "State of New Zealand Industry Training Organisations and Training Systems", the Engineering Industry Training Organisation paradigm provides a view in terms of the characteristics outlined above.

To maintain objectivity however, it is important to both articulate and appreciate the fundamental driving forces necessitating change in our vocational education and training programmes

The progress of reform in vocational education and training can be described as directed towards three major goals:

- Increasing the quality and quantity of training
- Improving the relevance of training to the needs of industry
- Developing a greater degree of national consistency and cohesion across public and private sector training systems.

Additionally, the workplace is changing because of technological change; environmental change; changes in world trade (tariffs); changes in labour market participation (gender and ethnic diversity); changing customer needs and expectations; and integrated participation (employees also make decisions that affect strategic direction).

A centrepiece in accommodating the above is the implementation of competency based training. Competency based training itself has three fundamental features – a specification of the required outcomes (performance criteria); training delivery aimed at these outcomes; an assessment process which confirms that the outcomes have been achieved. A great strength of competency based training is that it is a transparent system in which learners are aware of what they have to do in order to succeed. Furthermore a competency based system does not differentiate between competencies gained through an accredited course or the "university of life's" experiences. Arguably the latter can be spasmodic and therefore not as efficient, coherent, comprehensive and assured as in accredited training.

The vocational qualification system has to be driven by the needs of employment. It must be demand-led. This means a central role for employers, working in partnership with the workforce in the design of new vocational qualifications to meet the needs of work. Technology is gradually eliminating a substantial number of jobs at the lower end of the market. This decline places a serious threat on the availability of work for the unskilled. Further, experience has taught that skill itself cannot be satisfied by more apprenticeship placements for the young. Demographic changes;

births, deaths, means the workforce is aging (increasing school leaving age). Under this scenario, it is obvious New Zealand needs to improve the skill and qualification level of adults in employment. To cope we need to introduce a more open and flexible system. Barriers that restrict people's mobility and opportunity to transfer qualifications to other occupational areas including access to higher professional levels must be sensibly dismantled.

QUALIFICATIONS

Over the past three years the Engineering Industry Training Organisation has made substantial progress in establishing, by consultation, the skill needs of its industry. Participation by over 2000 engineers has resulted in the development of 350 unit standards at levels 1 to 5 on the National Qualifications Framework (Figure 1). Unit standards are themselves the building blocks for developing qualifications. The compilation of a qualification however, is governed by technical rules. For instance, a National Certificate must have a minimum of 40 credits at the stated level. Emphasis should be placed on broad based qualifications, especially at lower levels before higher level qualifications are tackled. Each qualification must be significantly different from another; a 50% difference is required. Qualification packages must have the capacity to accommodate changes in technology. The packaging of unit standards into national qualifications must always be undertaken with sensitivity to gender, ethnic and disability issues (Figure 2).

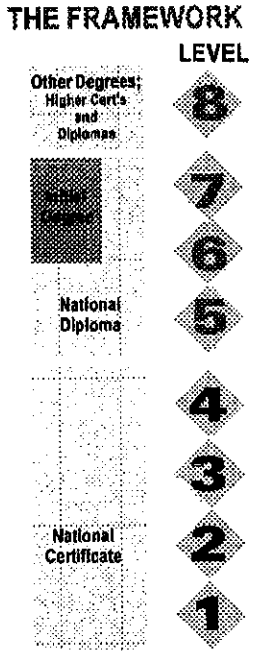

Figure 1

PRINCIPLES FOR PACKAGING QUALIFICATIONS

KEY NOTIONS

- Industry led
- National
- Logical sequence
- Transferable skills
- Compulsory, core, optional mix
- Pathways
- Non-duplicative
- Flexible
- Changes in technology accommodated
- Maori dimension
- Gender, ethnic, disability sensitivity

Figure 2

Ten new National Certificates in engineering have been developed by the EITO and are set to revolutionise industry training in workplaces around New Zealand. A substantial training need analysis just completed cost $2.5 million and possibly constituted the most significant review of skills training ever undertaken in New Zealand by a single industry (Figure 3). The result is qualifications that are relevant, up-to-date and comprehensive (Figure 4). New career pathways bridge the diverse sectors of industry and extend training coverage from process workers to degreed engineers. Today's engineers need to be multi-skilled and perceive themselves as professionals engaging in a wide range of relevant competencies.

APPRENTICESHIPS

The Engineering Industry Training Organisation now administers 2000 engineering related apprenticeships. 1994 and 1995 witnessed a significant investment by organisations in apprenticeship training (Figures 5 & 6). As a function of our response to undertake the responsibilities to administer apprenticeships, additional responsibilities have been added as our business knowledge and expertise matures. The Education and Training Support Agency (ETSA) has now transferred the administration of engineering off-job training programme to the Engineering Industry Training Organisation. Currently, the Organisation negotiates off-job training with 17 of the 25 New Zealand Polytechnics. Apart from purchasing the various off-job training programmes for industry, each programme itself must enable trainees to acquire nationally recognised qualifications or credits towards the same (Figure 7).

ENGINEERING INDUSTRY TRAINING ORGANISATION
QUALIFICATIONS GUIDELINES

NEW	***OLD***
National Certificate	*Trade Certificate*
Maintenance and Diagnostics	Fitter and Turner Fitter and Welder A
Engineering Machining	Toolmaker Machine Tool Setter
Composites	Fibre Reinforced Plastics
Metal Casting	Moulder Patternmaker
Heating and Ventilation *Specialist Strands:* *Ducted Systems* *Duct work and light metal fabrication* *Piped Systems*	Heating Ventilation & Airconditioning
Refrigeration and Airconditioning	Refrigeration Heating Ventilation & Airconditioning
Fabrication Engineering *Specialist Strands:* *Heavy* *Light* *Welding*	Boilermaker/ Welder Fitter & Welder B Sheetmetal worker

Figure 3

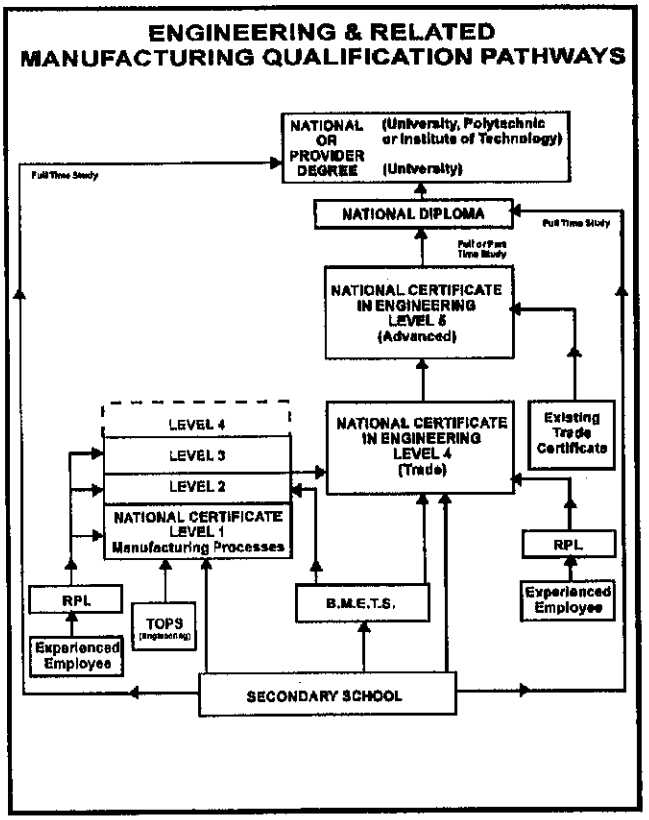

Figure 4

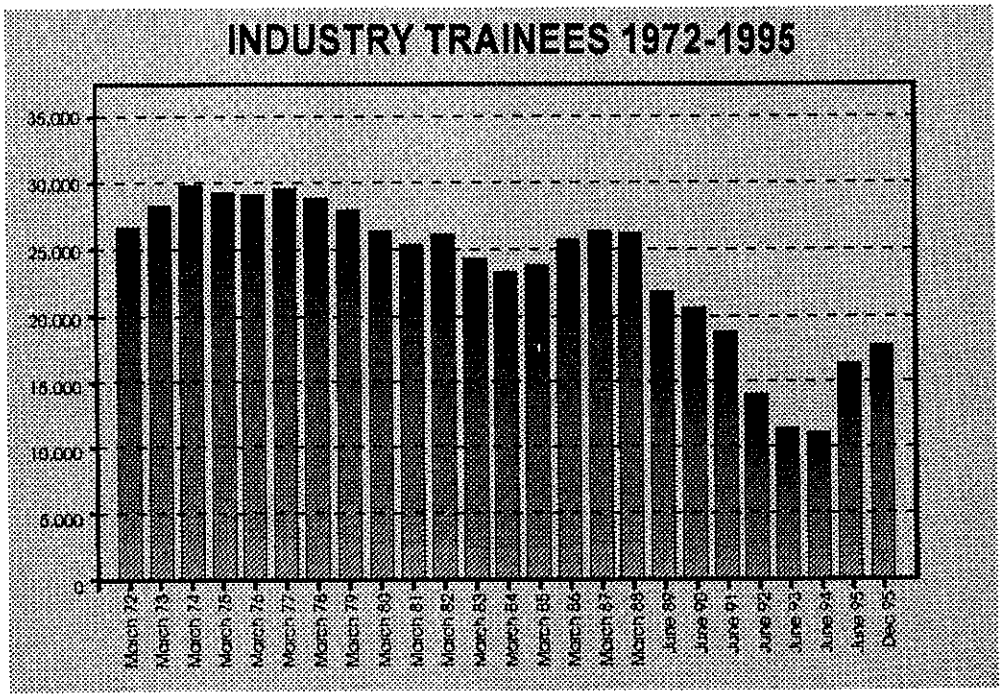

Figure 5

Higher qualifications are also being developed to facilitate lifelong learning. For instance, development work is progressing towards the introduction of a National Diploma in Engineering. This qualification will substantially replace the existing New Zealand Certificate in Engineering (NZCE) and include exciting options. The new qualification will not be constrained by the structures of the existing NZCE, but reflect outcomes identified by a training need analysis. The proposed National Diploma will be available for the Mechanical, Electrical, Civil and Chemical engineering sectors. Whilst each sector will have its discipline-specific unit standards it is anticipated that core generic subjects will be common to each sector's diploma. In this respect, core generics are expressed in terms of project management, finance, quality, communication etc. Additionally it is important that access to the new diploma has multiple entry and exit points, incorporate conventional school unit standards and has the facility to allow articulation across to a university degree programme at the appropriate level. Alternatively, the student can progress

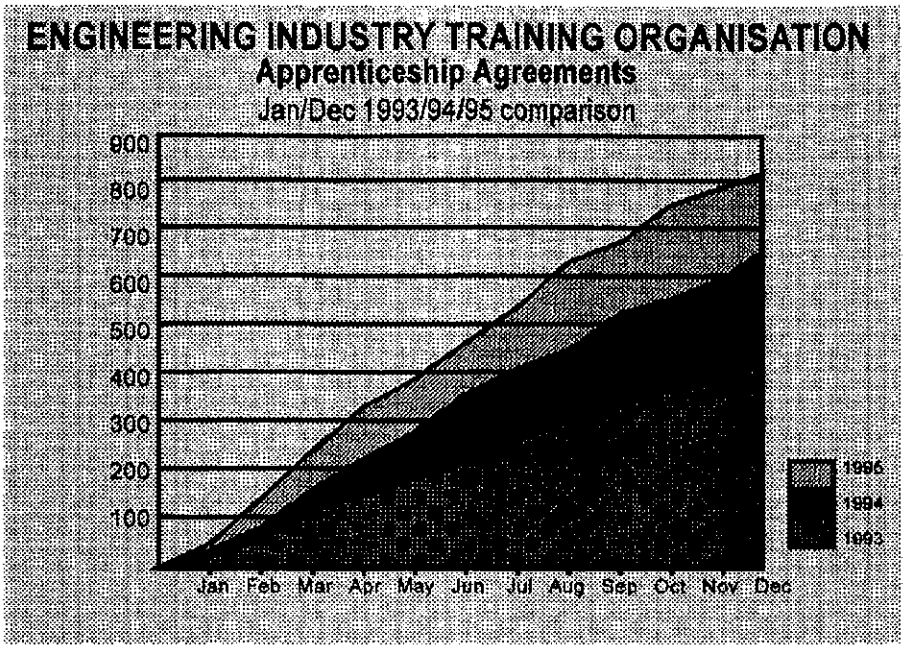

Figure 6

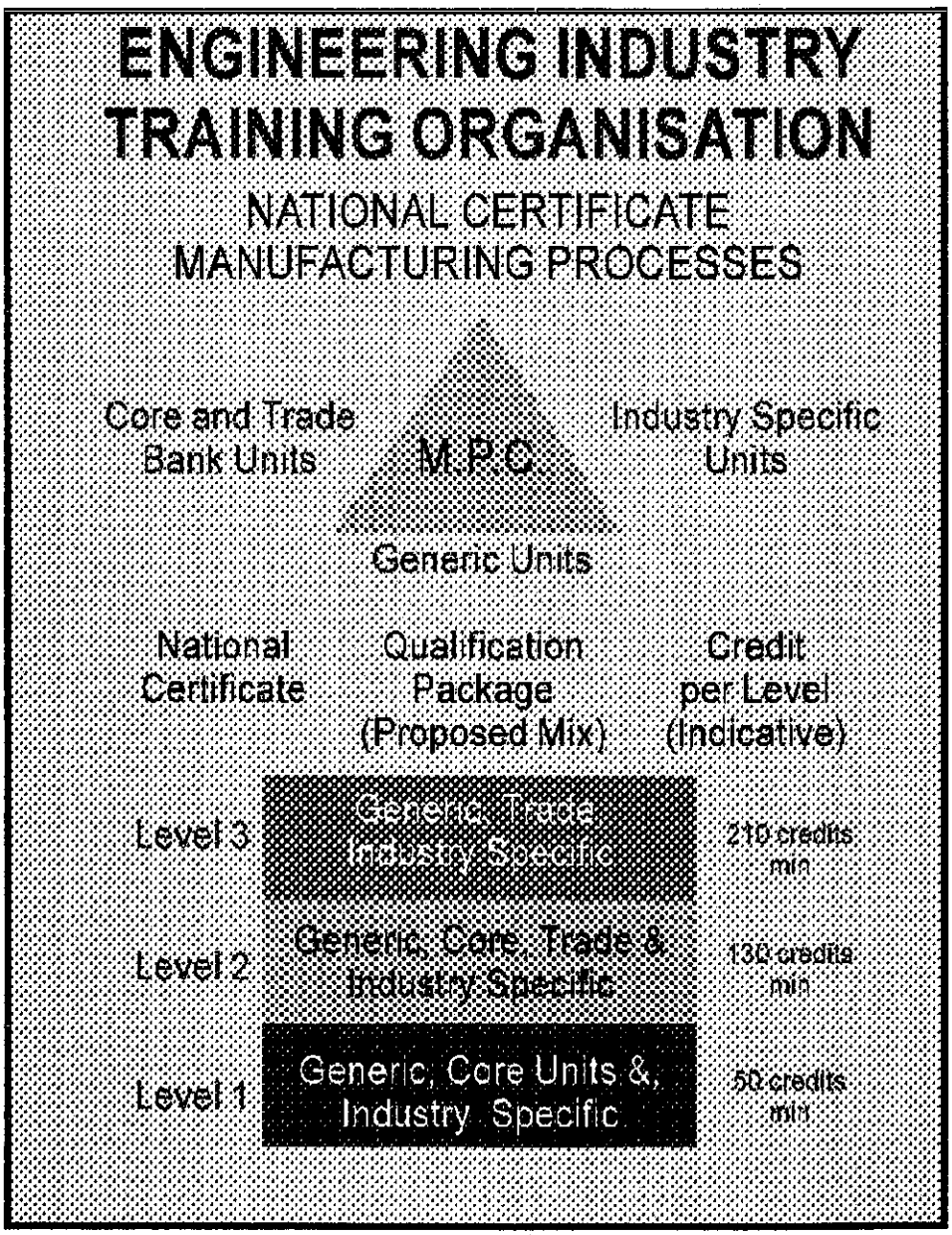

Figure 7

to a degree at a Polytechnic offering a National Degree course. Full implementation of the National Diploma in Engineering is forecast for 1999.

TRAINEESHIPS

In the past, New Zealand has been consumed with a passion focusing on training and education in traditional areas. In order for industry or individual enterprises to reap the benefits of educational and training reforms, then it must also include the up-skilling of the historically neglected employee; semi-skilled, process worker etc. The Engineering Industry Training Organisation is at the forefront of change in this area. The Organisation has invested heavily in education and training for all workers in engineering and related trades. It is committed to introducing skill pathways accessible to men and woman who have previously been unable to get existing skills formally recognised. Tolerant reforms in education and training now provides realistic "second chance learning" opportunities. Qualifications currently exist in manufacturing processes at levels 1, 2 and 3 on the National Qualifications Framework. Each qualification centres on a balanced education programme including generic skills; quality, communication, literacy etc, engineering core skills such as measurement, interpretation of sketches and drawings, selection and use of hand and power tools etc, and industry specific skills such as steel-making, fabrication, surface finishing etc (Figure 8).

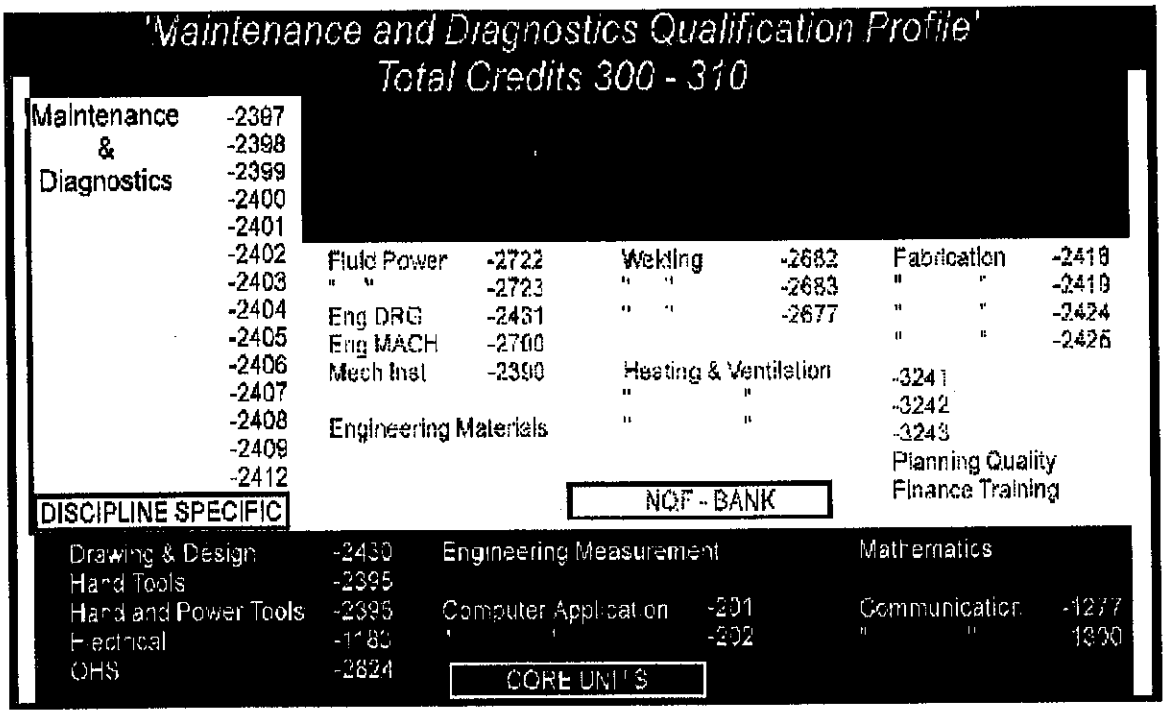

Figure 8

In 1996, the Engineering Industry Training Organisation intends to recruit and introduce 1000 trainees into structured and systematic training programmes as part of their career development.

Building on the best of traditional apprenticeships and the introduction of career paths for the historically neglected employee supports the key notion of a seamless education system (Figure 9).

ACCREDITATION TO REGISTER WORKPLACE ASSESSORS

The Engineering Industry Training Organisation is an incorporated society and was formally recognised under the Industry Training Act of 1992 in April 1993. Since its establishment the EITO has systematically worked towards developing the training for engineering and related manufacturing industries in accordance with the Act and the new

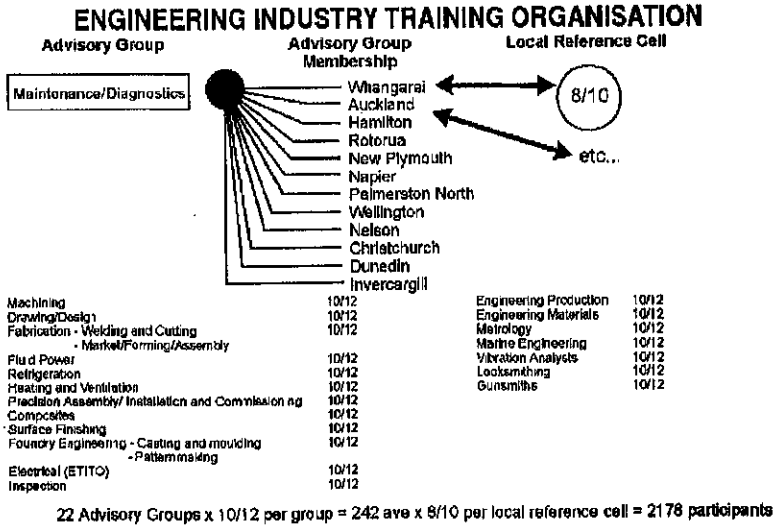

Figure 9

Qualifications Framework. Progress in this direction has already been discussed. New Zealand Qualifications Authority (NZQA) have introduced guidelines and criteria for all Industry Training Organisations wishing to become accredited to register workplace assessors. At the time of writing, the Engineering ITO, as a result of its quality management systems, is one of only 18 Industry Training Organisations accredited to register workplace assessors. Notwithstanding this position, NZQA has the legal authority to revoke accreditation at any time, should the circumstances demand it.

The process of assessor selection and the relationship between candidates, assessors and moderators is shown in Figures 10, 11 and 12.

Frequently, we are asked the question – what's new about competency assessment ? In one form or another, assessment based on competency has been around for a long time. Workplace assessment in the form it is now being introduced will however have increased benefits for both employers and employees. The assessment process will be much more systemised. It will be fair, and more consistent. Assessing competencies has the ability to engage industry participants in the relevance of training to the needs of today's workplace.

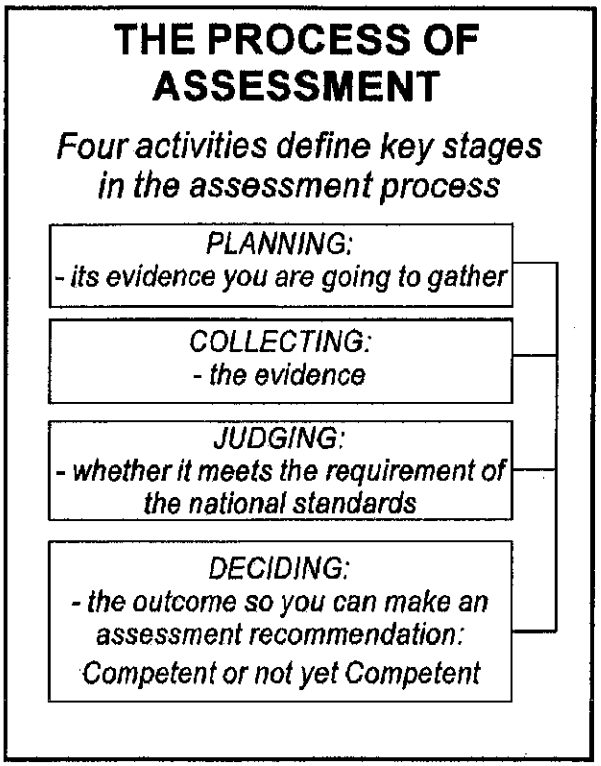

Figure 10

The objectives – more effective ways of producing quality goods and services – accessing appropriate education and training, satisfying and responsible jobs. Assessment in the workplace is about recognising existing skills and encouraging the development of more skills in the future.

Equally important is a basic change in attitude to work. Objectives must be shared and understood. Technical skills need to be complemented by social skills; problem solving, communication, decision making, health and safety, environmental issues, ethics and codes of behaviour will in some cases need realignment. In the interests of efficiency and equity, lifelong learning must become an asset available to everyone.

INTERFACING WITH HIGH SCHOOLS

The Engineering Industry Training Organisation has been pro-active in promoting engineering disciplines as career options to High School Students. It has been recognised for some time by industry that not all career advisers, nor in fact High School Principals have fully appreciated the dynamic environment and needs of commerce and industry. New Zealand is often characterised by its high numbers of lawyers and accountants per capita. The challenge for industry is to communicate clearly that challenging and rewarding careers are available in science and technology.

With the publicised rise in the school leaving age imminent, coupled with the accelerated pace of technological change, school curricula must, of necessity, be continuously under review and responsive to better prepare students for their post-compulsory education experience. A promotional brochure has been specifically designed by the EITO to heighten student awareness of engineering as an attractive, rewarding and professional career path poised to meet and interact with the technological challenges of the new millennium.

To enable students to make an informed career decision, the EITO has prepared documentation for schools containing unit standards prescriptions for introductory engineering skills that can be credited towards a national qualification.

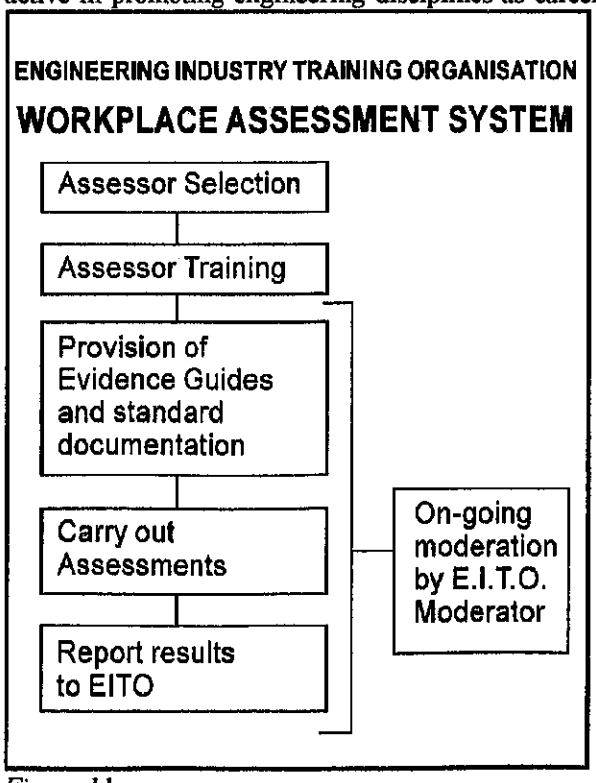

Figure 11

The selection of core unit standards included enables cross-crediting between a range of technical disciplines and, at the same time, provide life skills without imposing limitations on a final career option. To assist High School educators, the Organisation has also developed a concomitant assessment or evidence guide for each unit standard. This material may prove useful in assisting curriculum development.

In general, the EITO believes that it is both prudent and responsible for High School Students to engage in the elementary requirements of a variety of career prospects in order to determine suitability and interest levels prior to commitment.

Notwithstanding this comment, ingenuity is part of New Zealand's national characteristic and the objective the Engineering Industry Training Organisation's promotional initiative to High Schools is to establish and direct a cultural affinity towards engineering for young men and young women. Strategically, qualified engineers are well positioned to contribute effectively towards New Zealand's success in the international marketplace.

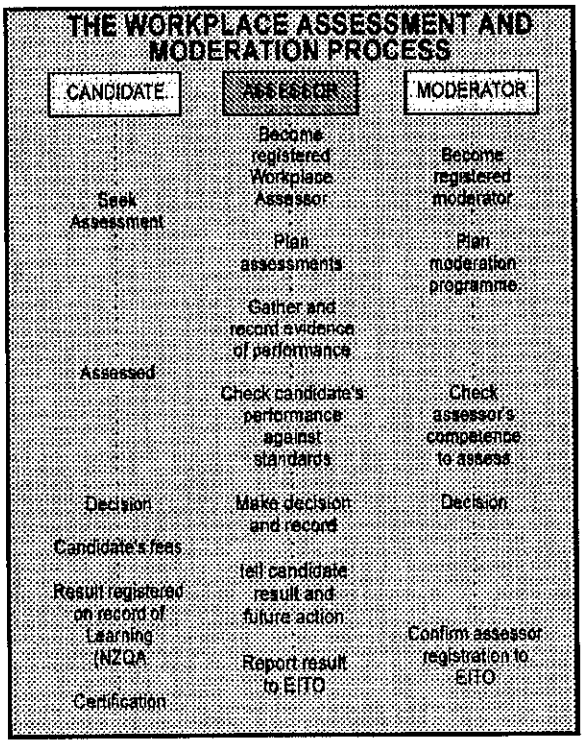

Figure 12

Some 60,000 copies of a brochure titled "We designed our engineering qualifications with the future in mind – yours" will be distributed to New Zealand High Schools in April 1996. The Engineering Industry Training Organisation recognises and acknowledges its partnership responsibilities with schools. Further, it is anticipated that in order to gain competency in a number of unit standards on offer, High Schools will enter into agreements with other Providers, such as Polytechnics, and invariably, forge strong industry linkages at the local or enterprise level.

This interface between Industry Training Organisations and High Schools is also designed to minimise the abrupt transition invariably experienced by young people as they emerge from the arguable comfort of a compulsory education period to employment.

HOW MANY ITO'S

In the foreseeable future, New Zealand must resolve the question of "how many ITOs". At the moment, we have 54 recognised Industry Training Organisations and this figure is likely to rise. The climb in ITO numbers is however, starting to plateau. In retrospect, the proliferation of ITOs encouraged by Government in the early 90s was strategically sound. Occupational ownership was enthusiastically staked and a plethora of ITOs and National Standards Bodies established with a commitment to advance industry training. Now the position has matured, there is a growing case for a review to determine the best long-term industry advisory mechanisms to ensure the flexible delivery of cost-effective training in a dynamic environment. In September 1994, Australia reduced the number of Industry Training Advisory Bodies from 47 to 18. In this instance, rationalisation was based on broad industry groupings, rather than occupational boundaries. The Australian experience clearly identified that in any rationalisation process, careful consideration must be given to the inherent tension between reducing the number of advisory bodies, and retaining strong industry ownership of the advisory network.

Notwithstanding the above comments, the New Zealand model for education and training reforms is operating successfully and internationally highly respected. Industry Training Organisations are, and continue to make, a valuable contribution to this success. Unquestionably, New Zealand participants in the reform process will be equally responsive and innovative in the implementation of appropriate advisory mechanisms to meet the challenges of the next phase.

In conclusion, Industry Training Organisation's as viewed through the eyes of the EITO are progressively satisfying the main characteristics of the Industry Training Act.

As we approach the new millennium, education and training has been identified as one of New Zealand's greatest challenges and therefore a key area for investment. From a pragmatic perspective investments must also be capable of measure and for retention, demonstrate an adequate return. Holistically, all stakeholders must therefore be resolute in their determination to secure a "win-win" outcome. The result for New Zealand – recognition as a World-Class Manufacturer.