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THE EDUCATION OF ENGINEERING TECHNICIANS AND TECHNOLOGISTS

John E. Terry, P. Eng.
Vice-President, Community Services
University College of Cape Breton
Sydney, Nova Scotia

This is one of a series of occasional papers planned or published by the Canadian Vocational Association. The views expressed do not necessarily represent the views of the Association.

The Canadian Vocational Association serves the professional needs of people in secondary and post-secondary institutions, government, business, industry and labour who are concerned with the present and future education and training needs of Canada's labour force. Specifically, the Association aims to:

Establish and maintain active national leadership in all types of vocational education.

Render service to provincial and local communities in promoting vocational education.

Provide a national forum for the study and discussion of vocational education.

Encourage the promotion and improvement of all vocational programs within the context of lifelong learning.

For further information about the series, or the Association, contact:

Canadian Vocational Association
P. O. Box 3435, Station D
Ottawa, Ontario K1P 6L4

Tel: (613) 596-2515

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Vice-President - Community Services
UNIVERSITY COLLEGE OF CAPE BRETON

John Terry obtained his Bachelor of Engineering (Mechanical) degree in 1948, and spent the next two years in Vancouver B.C., where he was employed with Canadian Sumner Iron Works.

In 1950 he moved to Cape Breton to join Dominion Coal Company and continued in the Coal Division of the Cape Breton Development Corporation until 1967 when he was appointed Principal of the Nova Scotia Eastern Institute of Technology.

He was appointed Senior Vice-President of the College of Cape Breton in 1974 and served in that capacity until 1982 when he became Chairman of the Maritime Provinces Higher Education Commission. In 1984 he returned to the University College of Cape Breton to assume his present position.

In March 1989 he was appointed Chairman of the Board of Directors, Cape Breton Development Corporation.

A member of several professional associations, he has been President of both the Association of Professional Engineers of Nova Scotia and the Mining Society of Nova Scotia. He has been active in many community organizations and served on provincial and maritime boards and advisory committees including the Maritime Municipal Training and Development Board and the Provincial Manpower Board.

In 1985 he was appointed to the Board of Directors, Nova Scotia Research Foundation Corporation and the Board of Governors, Canadian Corps of Commissionaires (Nova Scotia division).

John Terry joined the militia in 1951 as an Officer Cadet in the 45 Field Engineer Squadron and later commanded the Squadron in the rank of Major. He retired from the militia as Commander, Cape Breton Militia District in 1973 in the rank of Colonel and is presently Honorary Colonel of the 45 Field Engineer Squadron.

In August 1961, he married Janet Sue Kallak, St. Louis, Missouri. They have two boys, John and Brian; and two girls, Yvonne and Jennifer - all four are native Cape Bretoners.

THE EDUCATION OF ENGINEERING TECHNICIANS AND TECHNOLOGISTS

BACKGROUND - WHENCE WE CAME

A quarter century has passed since passage of the Federal Technical and Vocational Training Assistance Act in 1961, which precipitated a dramatic increase in technical education across Canada. All provinces were quick to take advantage of Federal financial assistance provided under the Act, and it is fair to say that the community college system in Canada evolved from that initial thrust to build vocational schools, technical institutes and colleges.

A quarter century has passed since the National Advisory Committee on Technological Education (NACTE), chaired by Garnet T. Page, General Secretary, Engineering Institute of Canada, prescribed national standards for engineering technology programs that were being offered by these new institutions.

The past quarter century has witnessed dramatic changes in our economy, **our** meaning the world economy. These changes have been driven almost entirely by the introduction of new technologies. The development of these new technologies has been phenomenal and the pace of their advancement is spectacular.

The NACTE included in its recommendations the use of advisory committees from business and industry, not only to develop the curriculum, but to monitor it on a continuing basis.

The question is: what is the state of the education of engineering technicians and technologists? Has it changed in relation to the changes that have taken place over the last quarter century? Does the "minimum twenty-four hundred

contact hours" prescribed by the NACTE in 1964 have any relevance today?

Consideration of these questions should take into account not only the **prescription** for educating technicians and technologists, that is, the curriculum, but more importantly, the **process** by which the necessary knowledge and skills are acquired.

CURRENT CIRCUMSTANCES - WHERE WE ARE

An article by Peter F. Drucker, published in the spring 1986 issue of Foreign Affairs, begins with this statement:

> The talk today is of the "changing world economy." I wish to argue that the world economy is not "changing"; it has already changed - in its foundations and in its structure - and in all probability the change is irreversible.

In his article, Drucker notes that "a major change in the world economy is the uncoupling of manufacturing production from manufacturing employment". The record shows that, while in the industrialized countries like the United States and Japan, manufacturing production has steadily increased, there has been a concomitant decrease in blue collar employment.

The prospects are that this trend will continue. For example, twenty-five years from now the American automobile industry is expected to employ perhaps a third of its present blue-collar workforce while production might increase by 50%.

The evidence suggests that decreasing the number of blue-collar manufacturing jobs is not merely a consequence of change, but rather an instrument for change - in order to compete effectively in what is already a global economy. As

Drucker puts it, "the attempt to preserve such blue-collar jobs is actually a prescription for unemployment".

The inference to be drawn is: we need, and will continue to need scientific and technical personnel, including engineering technicians and technologists, if we are to succeed in our pursuit of prosperity.

There are several signals indicating that national attention is being focused on the need for technological expertise if we are to compete successfully in the changed world economy:

a) the establishment of Federal and Provincial departments responsible for promoting the use of applied science and technology as a means to economic development;

b) the message from the 1988 National Conference on Technology and Innovation, chaired by the Prime Minister, that Canadian industry is ill-prepared for the 1990's;

c) establishment of the Council of Science and Technology Ministers;

d) establishment of the National Advisory Board on Science and Technology;

e) establishment of agencies like the Canadian Advanced Technology Association;

f) the establishment of Provincial Councils of Applied Science and Technology, and Technology Transfer Centres.

From all of the above, it is clear that the education of engineering technicians and technologists is a critical item on our agenda for national well-being.

In an address presented in January 1986, at Queens University, David, G. Vice, President of Northern Telecom Ltd., put it this way: "To do all this, we must have highly professional managers and well-trained, imaginative and enthusiastic technologists and engineers".

THE FUTURE - WHITHER WE GO

It was suggested earlier that we focus our attention not so much on the **prescription**, that is the curriculum for educating engineering technicians and technologists, but rather the **process** by which they acquire their skills and knowledge.

It might be useful first to identify two distinct forms of programs for technicians and technologists:

a) what we might call"regular programs" in which students enroll on a full-load or part-load basis leading to a certificate or diploma;

b) "specialized programs", or activities designed for particular clientele to meet their specific needs.

REGULAR PROGRAMS

With respect to the first, i.e., regular programs, we might raise these questions:

1) Are they relevant to today's requirements?
2) Are the advisory committees, which were recommended in the beginning, still functioning? Are they functioning effectively?
3) Are instructional staff up to date in the disciplines which they teach?
4) Are the linkages with business and industry strong and mutually beneficial?
5) What initiatives are being taken to convert programs to the cooperative mode?

6) What about accreditation, is it important? Is it essential? Why?
7) Is the curriculum too intensive in technological content? Should technicians and technologists have some competence in economics, business management, human relations?

Whatever the answers to these questions are, it seems fair to say that the institutes and colleges that offer programs for engineering technicians and technologists are doing it well, that graduates are obtaining relevant employment, and that the employers are pleased with the graduates they get.

SPECIALIZED PROGRAMS

Lets turn our attention to the second category of programs: the specialized programs designed for a specific clientele. This is relatively untilled ground with interesting opportunities for serving the educational needs of technicians and technologists. Consider just these three topics:

1) Continuing Professional Development:

Because of the accelerating pace of technological development it is essential for practicing technicians and technologists to keep up with the state-of-the-art. In his address at Queen's University, David Vice makes this point: "And that is why, in Northern Telecom, we have special programs for developing our engineers and keeping them current on technological and business trends". We can be sure that Northern Telecom does the same for their technicians and technologists.

2) Changing Roles:

Very little is done to facilitate a change of role for a technologist who wants to be a technician or a technician who aspires to become a professional engineer or an engineer who decides that he needs some of the special skills and knowledge of a technologist.

These players - technicians, technologists and engineers - are regarded as members of the "engineering team". As things presently stand their training takes place in separate systems and there is no interaction between them. Later, when they get down to business, technicians, technologists and engineers are expected to work together smoothly as members of the same engineering "team".

Teamwork or team spirit is simply not possible anymore than it would be if in baseball the catchers trained at one camp, pitchers at another, first basemen at another, and so on. We need to tie things together to achieve the right relationship and smooth interplay one between the other.

Dr. James Downey, President of the University of New Brunswick, makes this point beautifully in an article in the April 1989 issue of University Affairs:

Our present education system is an archipelago, with universities constituting one island, high schools another, primary and elementary schools another, and community colleges yet another. The ferry service between these islands is infrequent and unpredictable. What we shall need for the 21st century, if we are to meet the challenges of the "knowledge society" and combat the scourge of illiteracy, is a series of fixed links between the islands in order to mobilize and coordinate all of our considerable educational resources in the interest of the people and the society we serve.

3) Delivery

As stated earlier, we must consider the **process** by which technicians and technologists acquire their skills and knowledge, not just the prescription, i.e. the curriculum.

We are talking about a new clientele, different from the students who enroll in our "regular" programs. Catering to the new clientele requires new approaches to marketing, designing, packaging and delivering the programs we offer.

There must be lessons we can learn from organizations like Northern Telecom: how they design and deliver "special programs for developing our engineers and keeping them current on technological and business trends".

There are other major corporations from whom we can learn about the "business of education". A 1984 report, Corporate Classrooms The Learning Business, covers an extensive study by Nell Urich of the Carnegie Foundation.

The statistics are phenomenal: approximately 150 companies, offering over 2,250 courses at over 400 sites, to nearly 8 million people, at a cost of over $40 billion a year (vs. $60 billion plus for traditional colleges and universities)!

What is important to note is the difference between traditional education and the corporate systems.

The general perception is that traditional colleges and universities lack the flexibility and creativity to tailor curriculum and delivery to suit the clientele.

THE CVA CONNECTION

The challenge, of course, is to adapt to changing circumstances, to change the way we do things - to meet the challenge.

There is merit in James Downey's advice: that we need to link the islands in the archipelago of our education system.

CVA can be an agency of such change. Other associations are based on "institutional" membership, each representing a particular sector (island) of the archipelago. CVA, on the other hand, is an organization of individuals from all the islands, and from the mainland as well.

Uninhibited by sectoral interests, CVA is an appropriate forum for building the linkages, the bridges by which all who need it can have access to education for engineering technicians and technologists - and other fields of vocational education as well.

OPPORTUNITY

Problems present opportunities.
It often happens that the problem is the solution!

Example:
Problem:
How do we meet the challenge of change?
Solution:
Change!

Similarly:
Problem:
Students are spending all their time in video arcades and neglecting school.
Solution:
Bring video into the school!

And create learning materials/experiences that are animated, exciting, captivating - and relevant. The wizardry of electronic communication technology makes this possible. Every issue of National Geographic, since it was first published in 1889, can now be accommodated on a single laser video disc!

The opportunity to design and deliver education for engineering technicians and technologists as a continuum of professional development compels our attention.

It's an opportunity CVA might want to grasp.

The Canadian Vocational Association is the only national association devoted to the elopment of manpower resources at the technical, vocational and industrial level. If u are involved in any of the following activities associated with manpower elopment you should consider belonging to CVA: **•manpower training • human ources development • teaching • industrial training • personnel nagement • counselling • instructing • research • administration • supplier supplier's representative.**

Membership in the Canadian Vocational Association gives you an opportunity to:

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eceive and contribute to the Canadian Vocational Journal and other publications

ttend the annual convention and participate in panels, meetings, discussions and ıer activities

L'Association canadienne de la formation professionnelle est la seule association canadienne dévouée au développement des ressources du pays en matière de main-d'oeuvre.

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Une carte de membre de l'Association canadienne de la formation professionnelle vous permet de:

- Rencontrer d'autres membres et discuter avec eux de sujets d'intérêt commun.
- Recevoir les publications y compris le Journal de l'Association et contribuer à son contenu
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CANADIAN VOCATIONAL ASSOCIATION
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