Technology Education New Zealand

IPENZ Engineers New Zealand

IPENZ Informatory Note Seven

The Drive for Innovators and Entrepreneurs:
School governance and technology education

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IPENZ ENGINEERS NEW ZEALAND:
The Institution of Professional Engineers New Zealand Incorporated (IPENZ) is the non-aligned professional body for engineering and technology professionals in New Zealand. It seeks to contribute to the community in matters of national interest. One part of its contribution is to issue informatory notes, which give a learned view on important issues, independently of any commercial interest. Such notes are not consensus papers of the Institution membership. Rather, they explore issues and describe possible outcomes and/or scenarios that could arise or develop. Others are free to quote or use material from this note.

TENZ
Technology Education New Zealand (TENZ) was established in 1996 to provide a framework to support and promote technology/hangarau education in New Zealand. The network encompasses close to 1000 primary, intermediate and secondary teachers, tertiary personnel, teacher educators and practising technologists.

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Introduction

In February 2002 the Government released its blueprint for creating an innovative New Zealand to help the nation achieve its economic and social goals. *Growing an Innovative New Zealand* recognises the pivotal role of education, and refers to the recommendations in the final report to the Prime Minister of the Science and Innovation Advisory Council (SIAC), *Grow a Talented Nation,* which was released at the same time.

SIAC recommended to the Government that the compulsory education sector should provide programmes that will increase the number of innovative and entrepreneurial people in our society. It also clearly identifies the Technology curriculum as a vital element and suggests that examples of best practice in innovative education should be promulgated to support its implementation.

The SIAC report stated amongst its recommended actions that Boards of Trustees and Principals need to be informed of the importance of the skills and attitudes developed in the Technology curriculum; parents, students and employers must be made aware of the value of the subject for securing future educational and employment opportunities; and the Ministry of Education must recognise that a different approach to learning is required to implement the technology curriculum.

These recommendations challenge Boards of Trustees and Principals to ensure that schools prepare students for life in a "knowledge society". The aim of this note is to highlight the issues facing Trustees and Principals in the compulsory education sector as they fulfil governance responsibilities in the context of implementing technology education effectively in their schools.

Technology defined

The Ministry of Education defines technology as "a creative, purposeful activity aimed at meeting needs and opportunities through the development of products, systems and environments. Knowledge, skills and resources are combined to help solve practical problems. Technological practice takes place within and is defined by, social contexts".

The curriculum statement describes technology as an age-old human activity. People have always adapted resources to meet their needs. Our world is technological. Changing technology affects our environment and our quality of life. Technology plays an increasingly important part in our choices of food, health care, transport, entertainment – we use technology in almost every aspect of our daily life. As present/future consumers or producers of technological products, systems or environments, all students need an underlying level of technological literacy to play an informed role in this technological world. Technological literacy "is the ability to use, manage, assess and understand technology" (International Technology Education Association, 2000).

Innovation and entrepreneurship

Innovation is the act of creating something new and worthwhile, entrepreneurship is the act of carrying an innovation to market in a commercial manner. Innovation is a high-level creative activity that differs from improvisation (making do). Innovation can arise from accumulating and applying knowledge, but more often it is creative, arising from following intuition rather than conventional wisdom.

Development of innovative skills requires a supportive educational environment, and the technology curriculum provides it. Technology education is multi-disciplinary and about finding unique ways of meeting needs and responding to opportunities. At its best, technological practice extends the classroom – it takes students into the community, into local enterprise. It may also bring community partners into the school.

Entrepreneurial skills are about picking up and using innovation in a way that is commercially sensible. Partnerships with local enterprise will also develop entrepreneurial skills.

Technology education

In classrooms, technology education should be a process that aims to enhance a student's level of technological literacy. The curriculum specifies that technology programmes should be "designed to develop students' competence and confidence in understanding and using existing technologies and in creating solutions to technological problems" (*p. 7, Technology in the New Zealand Curriculum*, 1995).

The introduction of technology education has encouraged teachers to develop teaching strategies that are based on an informed facilitative style. Teachers intervene as appropriate in order to support, guide, and challenge. Their knowledge and skills can be used to assist students in refining ideas, selecting and accessing resources (including people from the wider community) and achieving quality outcomes. In turn these experiences often result in the development of additional innovative and entrepreneurial knowledge and skills for the teachers as well as their students.

Undertaking technological practice is very motivational and often empowering for students. It allows students to be presented with, or to identify themselves, authentic needs or opportunities. They can then work creatively and analytically, to identify, trial and evaluate potential solutions leading to full or partial implementation of their ideas within an appropriate context. Such practice allows for diversity in learning styles, encourages the vital element of curiosity, fosters teamwork and develops communication skills required to undertake collaborative research and to inform those affected by the project. Students are encouraged to take risks, show initiative, and take responsibility for their work. They learn to explore, research and above all begin the transition towards being independent learners, a skill that will be vital to them long after school when they must self-learn new knowledge and skills to retain their employability.

Technology education should provide genuine opportunities for students and teachers to interact in a mutually beneficial way with the wider community. These interactions enhance and clarify classroom learning and give students an appreciation of both the impact of technology on society and the ways the values, ethics and beliefs of individuals and groups influence technological development. The curriculum statement encourages teachers to make these links, noting that they are "important to a well developed, inclusive technology curriculum" (p. 17, *TNZC* 1995).

Technology education and ICT – a point of clarification

Technology education and the information communication and technology (ICT) strategy in a school are different. ICT has three major cross-curricular roles in schools. It provides a vital administrative tool for teachers and support staff, an education medium highly suited for delivery of information to students within any curriculum, and a tool for use by students in presenting their own work in any curriculum.

However, ICT is also one of seven technological areas, (along with biotechnology, food, electronics and control, materials, production and process, and structures and mechanisms) that may provide a context for students to undertake technological practice. Use of a personal computer is clearly an important skill for students, but in itself is not technology education in the ICT technological area. The ICT technological area is much wider, covering all forms of communication technology.

Resourcing the technology curriculum

Technology education has been introduced into schools over the past seven years. Graduates of Colleges of Education trained specifically in technology education are now taking up teaching positions. A limited amount of professional development has been available to practising teachers. However with the rapid changes in this area it is essential that further and ongoing professional development is provided. It is important that more traditional programmes are not just relabelled as technology without evaluation to ensure that they reflect technology education as outlined above. Similarly teaching support materials should be evaluated in terms of their usefulness.

Secondly there is the issue of physical space and the timetable, which tends to affect secondary and intermediate schools more than primary schools. In the worst cases the timetable has become almost an obstacle to rather than a facilitator of good education. As the most recent curriculum, technology is often made to fit around other fixed subjects, and gets a relatively poor deal. It is also squashed into rooms that suit traditional teaching, yet this free-flowing subject can be taught almost anywhere – good practice uses the home, businesses and community facilities as well as the school room; but it requires willingness on the part of the timetabler, the Principal and the Board to set such possibilities loose. Technology suites exist in many schools now, but too many are separated rooms where food technology, materials technology, and the ICT rooms containing rows of personal computers operate in isolation from each other, again implicitly contradicting the nature of the curriculum. Creative and efficient use of resources needs to include timetabling and planning for technology that acknowledges and validates this learning area.

Lastly, there is the issue of equipment and consumables. To allow students to explore, experiment and trial is expensive, and often not allowed for in allocated budgets. Some resources are available from the local community, especially in the form of time and advice. Sponsorship of activities may be appropriate in some circumstances.

Implementing technology education as envisaged by the curriculum is a challenge that offers huge potential benefits including supporting the development of innovative and entrepreneurial members of New Zealand society. Technology contributes to students' intellectual and practical development, equipping them for life in a technological society.

The following are questions that may promote discussion in your school community about the issues raised in this note.

> *How comfortable are our parents with the technology curriculum?*

> *Do we have a strategy in place to inform parents of our achievements and improve their understanding of technology education?*

> *Do we have a long-term plan that ensures we offer learning experiences that allow our students to make progress in technology education?*

> *How do we ensure school management and teachers of other curriculum areas have an understanding of technology education that allows them to provide appropriate support?*

> *Are we providing our staff with opportunities for ongoing professional development in technology education?*

> *Do our school policies support the successful implementation of technology education in our school?*

> *Do we have a realistic budget that allows our teachers to provide the resources students need to successfully undertake technology education?*

> *Do we have policies and procedures in place that make it easy for our teachers to access community and business expertise?*

> *How do we know that students undertaking technology education outside our school are involved in quality programmes that ensure their progress?*

> *Do our technology education programmes promote the value of innovative and entrepreneurial activity?*

Techlink project

IPENZ has received funding from Industry New Zealand to develop case studies of best practice in technology education. The Techlink project will be undertaken over the next 18 months and will produce nine resource packages focused on technology-based innovation. The project will cover the research, development and production of the resource packages and the trial of them in 18 schools. Two technologists will be assigned to mentor each school.

There will be nine resource packages developed in three phases during 2003. For each phase material for nine case studies of innovative technological practice will be collected. Two schools (six teachers) from three regions will be invited to use this material to support the planning, implementation and evaluation of a technology-focussed unit of work. Case study material from each school will be collected and, along with the technological case study material, will be analysed in terms of the curriculum.

For more information about the Techlink project contact
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Contributors

IPENZ would like to thank Vicki Compton, Lesley Moffat, Glynn McGregor and Marshall Clark

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