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Teacher Change in a Developing Curriculum Area: The Example of Trade Teachers in the New Zealand Technology Curriculum

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Abstract

Technology education for all students is a relatively new phenomenon in national and international curricula. Although New Zealand has a long history of technical education in the senior primary and secondary school, a curriculum for technology education for all students has only recently been introduced. Aspects of technology have been included in many existing school programmes, but these have not been presented and undertaken in a coherent way. Technology as it developed in past curricula encompassed a limited range of skills, processes and knowledge. The general aims of technology education in *Technology in the New Zealand Curriculum* (Ministry of Education, 1995) are to develop technological knowledge and understanding, an understanding and awareness of the interrelationship between technology and society, and technological capability in a number of technological areas.

This paper will report on the changes that a group of traditional technical teachers have been required to undergo and the way in which these teachers have, or have not, been successful in adapting to a new technology curriculum. The influences on this particular group will be explored, as well as the factors that have led to some of these teachers adopting the technology.

Background

New Zealand has had a long history of technical education in the senior primary and secondary school. A national school system was introduced in New Zealand in 1877 and technical education was introduced in 1890, with metal and woodwork for boys, and cooking, needlework and/or laundry for girls being taught in the last two years of primary schooling (10 to 12-year-olds). At the same time, technical high schools were developed and tended to channel working-class children into manual and trade employment. After 1945, common core subjects such as metal and woodwork and cooking and sewing were introduced in all high schools for third and fourth form students (13 to 15-year-olds).

During the 1970s and 1980s there were moves to include more design focuses and the use of a range of materials. This saw the emergence of subjects such as workshop technology and graphics and design. During this time there were also attempts to break down the gender stereotyping by having girls and boys take all technical/technology subjects in senior primary and junior high school, however by senior high school these subjects tended to be gender specific (McKenzie, 1992). Also during the 1980s there was an increasing emphasis on technology in existing school subjects such as science (technology as applied science), social studies (technological determinism) and information technology (computers). Technology, therefore, as it has developed in past curricula, encompassed a

limited range of skills, processes and knowledge resulting from a narrow and gender-specific perspective. As a consequence, students have not had the broad experiences in technology which they need to successfully contribute to society.

As part of an educational review process, a Ministerial Task Group Reviewing Science and Technology Education (Ministry of Research, Science and Technology, 1992) recommended:

- a technology curriculum be developed as an area in its own right, although they noted confusion over its definition
- there be adequate teacher training and resourcing for technology education
- technology curricula should not be imported from overseas.

Towards the current curriculum

The New Zealand Curriculum Framework defines seven broad essential learning areas rather than subject areas. The seven essential learning areas, that describe in broad terms the knowledge and understanding that all students need to acquire, are health and well-being, the arts, social sciences, technology, science, mathematics, and language and languages. Schools have flexibility in how this will be achieved and are responsible for making implementation decisions.

The New Zealand Curriculum Framework requires that all National Curriculum statements in the essential learning areas specify clear learning outcomes against which students' achievements can be assessed. These learning outcomes or objectives must be defined over eight progressive levels and be grouped in a number of strands. In addition, the Framework requires that its principles must be reflected in the learning area documents. These principles relate to learning and achievement, development of school programmes and aspects of social justice and equity. Each strand in a curriculum has a list of achievement aims and is divided into eight levels of 'achievement objectives', which aim to describe the progression of learning from Year 1 to Year 13.

The general aims of technology education in *Technology in the New Zealand Curriculum* (Ministry of Education, 1995) are to develop:

- technological knowledge and understanding
- an understanding and awareness of the interrelationship between technology and society
- technological capability.

In the New Zealand technology curriculum the technological areas include materials technology, information and communication technology, electronics and control technology, biotechnology, structures and mechanisms, process and production technology, and food technology.

Teacher development from 1994-9

Since 1994 there have been major teacher development programmes, including the ones highlighted earlier. Current Ministry of Education estimates indicate that 80% of teachers have been involved in some form of professional development. However, most schools are only involved in teacher development programmes for a short period of time. Research by Moreland (1997) highlights that to bring about changes in classroom practice can take two years of intensive work. Yet most teachers have not been able to experience this level of teacher development; in fact most teachers have attended for one to three days over the last five years.

Changes in practice

Jones and Moreland (1998) report that there have been changes in the majority of teachers' perceptions of technology and technology education since 1992-3 (Jones and Carr, 1992). Teachers now have much broader concepts of technology and technology education consistent with the technology curriculum. However, greater teacher understanding is required of technological concepts and procedures in the different technological areas. Secondary schools are now developing new facilities and are starting on the development of programmes. They are adapting existing facilities associated with workshop technology and home economics to reflect the seven technological areas outlined in the curriculum statement.

Part of the reason for the lack of technological outcomes being apparent in school programmes is the lack of understanding in three key areas. These are assessment, both formative and summative procedures; progression in student learning; and teacher technological knowledge. These are key issues that require much further research and development. Funded research on assessment has already begun (Jones and Moreland, 1998) and this research has already highlighted the difficulty of assessment in technology if there is a lack of agreed organisational concepts in technology and notions of progression in these.

Exploring changes in trade teachers

Ten trade-trained¹ specialist teachers completed a detailed questionnaire about the implementation of the technology curriculum. This was based on previous research undertaken by Jones and Carr in 1992-3. In 1999, trade-trained specialist teachers' perceptions of technology education have revealed some positive changes in attitude toward technology education, but implementation has revealed some minor difficulties. On comparing a previous survey conducted by Jones and Carr (1992), a change of attitude by specialist teachers toward technology has occurred. In 1992 the emphasis in the workshop craft curriculum at secondary school was on 'design and make' and using a variety of skills to realise practical outcomes. Describing workshop craft, one teacher wrote:

¹ These teachers came from an apprenticeship/trade background before teacher training.

“Students should learn how things work and operate, how materials behave... some this way, and how you see tools to shape things to make things and eventually come out with some practical outcome. There is knowledge, there is designing and there is some practical outcome.”

The technology curriculum has much more width to it than workshop craft with its emphasis on design and make. Although design was a major part of the curriculum, it was not fully developed in practice. The following comment reflects the view of about 30% of current materials technology teachers:

“Workshop craft started with a product usually displayed by the teacher and students' products had very little individual input. With technology, students work towards producing a product to solve a particular problem. They are never sure of the outcome before they start their work.”

Technology education has a range of new skills, such as investigating current technological practice, interviewing other people to establish a need, comparing other people's attitudes and values, working together in groups in a workshop environment, and debating the impacts of technology on the environment and society. Typical comments made by current teachers (90%) were:

“With technology we are working with a greater range of materials and processes. More emphasis is being given to utilising cooperative skills and the investigation/experimentation of other technologies to find a solution is at a greater depth. As a teacher I am now becoming far more experienced in an extensive range of materials.”

Technology education appears to have encouraged trade-trained technical teachers at least to teach up to the workshop craft document, and has encouraged most teachers to go much further; that is into the technology curriculum. All teachers interviewed felt that their trade background was of prime importance for technology education in New Zealand.

Eighty percent of these trade-trained teachers were initially reluctant to change to technology and had some difficulty coping with the students' perceived lack of technical skills and take home value², as well as coping with the sheer breadth of the new document. As one of these teachers stated:

“The new (technology) document is so wide you could drive a bus through it and not hit the sides of the bus.”

Another said:

“I am concerned that the ability (for the teacher) to deliver the skills that will assist in trade training is being hindered. Without that concern I would be

² Taking a product home that has perceived value by the student and parents

reasonably comfortable (with technology), though there is still the pressure of (a lack of) time.”

It can be seen that the secondary school trade-trained teachers' background training influences what they think technology education is about and what they think the students should be learning. Most teachers are attempting to add parts of the technology document to their programmes, but their past experiences in and out of school have tended to make change slow. Although all the teachers in this sample had had some professional development, the emphasis in the professional development programmes was on developing their ideas of technology rather than helping to develop classroom practice and subsequent student learning in technology. Developing detailed units of work, in terms of developing full technological outcomes, has only been a recent development.

Understanding the philosophy of the technology document has given some concern to many teachers. This was coupled with the feeling that the practical area of the curriculum was being hijacked by the academics who had few capability (practical) skills. With parts of the technology curriculum already being taught in other subject areas of schools, the reaction of one workshop craft teacher in 1995 was:

“Oh hell, I'm out of a job.”

Another said:

“It's good to see our subject getting a face-lift and I have no concerns.”

These teachers were equally divided in their views of the technology curriculum; either adopting the status quo or adapting to meet the new curriculum.

Most workshop craft teachers felt that by adding the social strand to their workshop craft project they had incorporated technology into their subject's existing structure. They were willing to change their subject's name, but feared they may not be listened to by the school administration, who were generally classified as academics. The majority of these trade-trained teachers' view of technology was restricted to the subject within which they were trained and taught. These teachers now felt that at least four technological areas could be adequately taught in their existing facilities – should the facilities be upgraded to suit the required changes.

Changes in the senior examinations currently pose a problem for the majority of teachers surveyed. The current internally assessed examination still has an emphasis on the design and make philosophy, though some minor changes have occurred in line with technology. Major change is occurring to the senior examination system in 2001, when New Zealand will see a new system in place incorporating technology to its fullest extent as outlined in the national curriculum statement. This will give a commonly defined goal for teachers of technology education in the junior school to work towards.

From the above discussion, it can be seen that there are changes being introduced by traditional trade teachers as a result of the introduction of the technology curriculum and associated professional development. This is consistent with other research on teachers generally in technology (Jones, 1999). Although there is a long way to go, technology is becoming an established area of learning in the New Zealand school system.

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