Distance Education for New Zealand Technician Surveyors:  
A Review of the Options

Authors:  
Associate Professor David Dowling: Associate Dean (Academic), Faculty of  
Engineering and Surveying, University of Southern Queensland, Toowoomba,  
Queensland, 4350 Australia. dowling@usq.edu.au.  

Robert Taylor: Lecturer, School of the Built Environment, Unitec New Zealand,  
Auckland, New Zealand. rwtaylor@unitec.ac.nz

Presenter: Robert Taylor

Abstract  
Up until 1996 the Open Polytechnic of New Zealand offered the New Zealand Certificate in  
Surveying by distance education. Since the demise of that programme, the only surveying  
programmes offered in New Zealand are the Bachelor of Surveying at Otago University in  
Dunedin, and the National Diploma in Surveying offered through UNITEC in Auckland. There  
have been repeated calls by sections of the industry for the National Diploma in Surveying to be  
available throughout New Zealand by distance education. This paper begins with a discussion of  
the need for the proposed programme, the likely market, and the advantages and disadvantages  
of offering such a programme. It then discusses the major issues that need to be addressed, and  
the obstacles to be overcome if such a proposal was to become reality. In doing so it draws on  
the University of Southern Queensland’s experience of offering surveying and GIS programmes  
by distance education in Australia, and, in partnership with the Open Polytechnic of New  
Zealand, the Bachelor of Engineering Technology programme in New Zealand. The paper  
concludes by exploring some models that could be used to implement the proposal.

Background  
To avoid confusion the term ‘course’ in this paper refers to a single subject, or paper, and the  
term ‘programme’ is used to describe a designated set of courses that lead to an award such as a  
degree or diploma.

There are currently only two surveying programmes offered at the tertiary level in New Zealand:  
A four year Bachelor of Surveying degree at Otago University in Dunedin; and  
A two year National Diploma in Surveying (NDS) at Unitec in Auckland

Both these programmes are offered in the full-time on-campus mode, although Unitec does to  
some extent cater for part-time study as most of its higher level classes are timetabled in the  
evening to support students who work full-time. These programmes are not available by distance  
education at the present time, although a small number of individual courses are available in this  
mode from each of the institutions.

The New Zealand Institute of Surveyors (NZIS) formulated the National Diploma in Surveying  
(NDS) to replace the New Zealand Certificate in Surveying (NZCS) programme as the  
educational qualification for Surveying Technicians. It was registered with the New Zealand  
Qualifications Authority (NZQA) in April 1998. It was anticipated that this programme would  
be offered by Polytechnics throughout the country and that it would also be available by distance  
education. However, as previously stated, this programme is only available through Unitec in  
Auckland.
The next comprehensive review of this programme is planned to take place in November 2004. It is therefore important for the industry to review its needs and to explore its options before that formal review.

**The Unitec National Diploma in Surveying Programme**
The National Diploma in Surveying is a two year full-time equivalent programme that provides students with the underpinning knowledge and skills required by a survey technician. The curriculum includes studies in surveying, computing, civil engineering, communications, earth science and geography. The NDS includes an optional strand in Mine Surveying, however this strand is not available as it is not taught at Unitec.

To gain entry to the programme applicants must have completed the penultimate year at high school, i.e. sixth form. The demand for the Unitec NDS programme is shown in Table 1 where course enrolment data has been summarised to show the equivalent full-time student enrolments.

<table>
<thead>
<tr>
<th>Unitec National Diploma in Surveying</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
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<tr>
<td>Full-time Equivalent Student enrolments</td>
<td>50</td>
<td>38</td>
<td>27</td>
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<td>27</td>
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**Table 1: On-Campus Student Enrolments in Programmes offered by Unitec**

The National Diploma in Surveying does not lead to professional status and there is not a defined route for diplomats to progress to higher levels in the profession. Diplomats who wish to become a Licensed Surveyor currently have only one option, and that is to study full-time and complete the Bachelor of Surveying degree at Otago University in Dunedin. This would normally take at least two and a half years studying full-time, an expensive option for those who are already in the workforce and who may have considerable family and financial commitments.

The lack of career path opportunities for surveying technicians continues a pattern which has been evident since the NZCS was introduced in the early 1970’s. Many become so disenchanted with the industry that they leave and pursue other career opportunities. This is disappointing for the individuals concerned and also for the industry as it loses skilled members of its workforce.

The fact that the NDS programme is only offered full-time on-campus by Unitec means that surveyors who are not located in the Auckland region are disadvantaged. Firstly, their staff cannot access surveying education, either part-time or by distance education. Secondly, because there is a shortage of surveying staff in Auckland, staff from other regions are attracted to Auckland where they are able to work and study part-time. There is anecdotal evidence to suggest that many of these people do not return to the regions when they have completed their studies.

**The History of Distance Education for Surveyors in New Zealand**
Until 1996 the Open Polytechnic of New Zealand (TOPNZ) offered two New Zealand Certificate (NZC) programmes by distance education: the NZC in Land Surveying and the NZC in Survey Drafting. The Polytechnic also developed and offered a Land Information Systems (LIS) programme at this time. Table 2 shows the enrolment data for these programmes which were discontinued in 1996 because of falling enrolments and changes in industry training requirements.

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</tbody>
</table>
Table 2: Student Enrolments in Distance Education Programmes offered by TOPNZ

Table 3 shows the enrolment data for the small number of courses Unitec has offered by distance education, including the course ‘Introductory Surveying’. Unfortunately, because of concerns about the quality of industry supervision, the external offer of this course was cancelled in 2003.

Table 3: Enrolments in Distance Education Courses offered by Unitec

The data in Tables 2 and 3 indicate that there has been, and continues to be, a demand for distance education programmes for surveying technicians in New Zealand. It must be emphasised that the data in Table 3 represents enrolments in individual courses. Thus, these students are enrolling in these courses despite the fact that they are unable to study the core surveying courses in the NDS, nor complete the whole programme by distance education.

Before looking at the benefits of providing surveying programmes by distance education in New Zealand, it is worth looking at the Australian experience.

The Recent History of Distance Education for Surveyors in Australia

Although most tertiary education is delivered in an on-campus environment around the world there is a long history of distance education in Australia (Jarvis et al., 2003). This statement holds true for the surveying profession as well as for many other professions. Over the years a number of Australian educational institutions have offered distance education programmes in surveying. However, the authors are aware of only institution that is currently offering whole programmes by this study mode.

The University of Southern Queensland, which is located in Toowoomba, Queensland, is one of Australia’s leading regional universities and is noted for the excellence of its distance education programmes and its flexible approach to learning. In 2004 the University enrolled more than 25,000 students, with over 19,000 studying by distance education. The Faculty of Engineering and Surveying has 2700 students enrolled in engineering and surveying programmes, 75% of whom study by distance education.

USQ offered its first surveying programme by distance education in 1977, a two year Associate Diploma in Applied Science (Surveying), now known as the Associate Degree in Surveying. In
the intervening period a number of other programmes have been developed:
A three year Bachelor of Technology (Surveying) was introduced in 1993
A four year Bachelor of Surveying was offered by distance education in 1996
A three year Bachelor of Technology (GIS) was introduced in 1996
A two year Associate Degree in GIS was introduced in 2000 All of these programmes are currently offered on-campus and by distance education and they are also highly articulated to enable students to transfer between programmes with maximum credit. This normally means that graduates from one programme would only have to study full time for one year, or for two years part-time, to complete the programme one level above their existing award.

Table 4 shows the external enrolment data for these programmes during the period 19992004.

<table>
<thead>
<tr>
<th>External Surveying and GIS Programmes</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Surveying</td>
<td>72</td>
<td>71</td>
<td>67</td>
<td>63</td>
<td>70</td>
<td>91</td>
</tr>
<tr>
<td>Bachelor of Technology (GIS)</td>
<td>55</td>
<td>42</td>
<td>49</td>
<td>37</td>
<td>40</td>
<td>36</td>
</tr>
<tr>
<td>Bachelor of Technology (Surveying)</td>
<td>87</td>
<td>67</td>
<td>59</td>
<td>43</td>
<td>44</td>
<td>45</td>
</tr>
<tr>
<td>Associate Degree in GIS</td>
<td>-</td>
<td>8</td>
<td>15</td>
<td>28</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>Associate Degree in Surveying</td>
<td>88</td>
<td>71</td>
<td>69</td>
<td>69</td>
<td>63</td>
<td>79</td>
</tr>
<tr>
<td>Totals</td>
<td>302</td>
<td>259</td>
<td>259</td>
<td>240</td>
<td>240</td>
<td>273</td>
</tr>
</tbody>
</table>

Table 4: External Student Enrolments in Programmes offered by USQ

Following a recent review of the programmes the Faculty will, from 2005, offer the following three undergraduate programmes, each with two major studies: GIS and Surveying.
A four year Bachelor of Spatial Science
A three year Bachelor of Spatial Science Technology
A two year Associate Degree in Spatial Science

In effect a four year GIS programme was added to the five existing programmes and then these six programmes were collapsed into the three new programmes.

With these new programmes USQ continues its tradition of being the only tertiary institution in Australia to offer a fully articulated suite of surveying and GIS programmes, and to offer these in both the on-campus and external modes. The Surveyors Board of Queensland has accredited these programmes and will recognise graduates from the four-year Surveying major in the Bachelor of Spatial Science programme for Registration and Licensing purposes.

The USQ Distance Education Model
The USQ programmes have been designed to cater for the specific needs of distance education students who often have to fit study into a busy schedule of work and family commitments. The students who enrol in the programmes normally study part-time and therefore take at least twice as long to complete their programme when compared to a fulltime student. The only on-campus experience these students have is when they attend a residential school for one week in most years of their programme.

The Faculty employs a wide range of teaching methodologies for distance education students. These include traditional printed study materials, audiotapes, videos, interactive tele-tutorials (with both audio and video links), computer-based systems (simulations, CDROMS, etc.), and internet based systems (content delivery, assignment submission, marking, and return, discussion
groups, etc.). Distance education students also have access to study centres located throughout eastern Australia and South East Asia, many equipped with library and computing facilities.

Although there has been a long history of distance education programmes being provided for surveying technicians in Australia, this has not been the case for professional level programmes. This is because of the challenges associated with their implementation and with achieving professional accreditation. These difficulties have included the ability of students to undertake practical work, to learn to work in teams, to study an academically demanding and conceptually difficult curriculum, and to absorb the ethos of the surveying discipline.

To overcome these difficulties the Faculty has developed many innovative and practical approaches to enhance the design and delivery of its distance education programmes. Two of these innovations are discussed in the following paragraphs.

Firstly, because the majority of the Faculty’s students are enrolled in distance education programmes the primacy of these students is recognised throughout the curriculum design process. This has meant that when decisions have had to be made they favoured this cohort rather than the on-campus cohort. When accrediting the Faculty’s professional engineering programmes in 2001 the Institution of Engineers, Australia, Accreditation Panel recognised the uniqueness of the USQ approach: “The arrangements at USQ are very different from those at conventional universities. The culture of external studies and student-centred learning is all-pervasive.” (IEAust, 2001, p5).

Secondly, the need to accommodate practical work has always posed special problems for the Faculty in presenting its distance education programmes. Initially this was resolved by the introduction of compulsory residential schools, but attendance at course-based residential schools often proved difficult and expensive for external students. This led to the development of Practice courses.

Practice courses are non-course specific residential schools, each designed to enable students to acquire both the practical skills and generic competencies appropriate to a particular level of programme. Thus, a Practice course may involve activities such as lectures, tutorials, practical work and student seminars on topics ranging from surveying and GIS through to professional responsibility and commercial reality. For distance education students a Practice course may be regarded as a one week residential school as it involves between 30 and 40 hours of integrated activities spread over five days spent at the Toowoomba campus of the University. When report writing and other off campus activities are included the total workload required for a student to complete a Practice course is approximately 50 hours.

Students would normally complete a Practice course in most years of their programme. They may enrol in a Practice course at any time after they have completed the prerequisite courses. Thus, they have the flexibility to choose which year they will complete a Practice course.

The Advantages of Distance Education Programmes

USQ’s early experience with distance education for surveying technicians indicated that the commencing students had, on average, tertiary entrance scores that were equal to or better than those of the students entering the on-campus Bachelor of Surveying programmes offered by some other institutions. It was therefore obvious that there were a large number of highly qualified students who, for whatever reason, had not chosen to undertake full-time studies in surveying. It was also clear that the majority of these students were already working in the surveying industry, and that many of them had the potential to work at the professional level if
they were given the opportunity to complete the required degree level studies.

Thus, the distance education offers of USQ’s surveying programmes were developed to address the educational needs of people employed in the surveying workforce in regional areas of Queensland, which is a highly decentralised state. People living in these regional areas, and around Australia, now have the ability to enhance their career opportunities in the industry without leaving their hometown. Interestingly, many of these distance education students live and work in metropolitan areas where surveying and GIS programmes are available through TAFE institutions and universities.

Many employers have welcomed the opportunity to support and empower their existing experienced, committed and skilled staff to achieve their career goals. The provision of distance education programmes in Australia has therefore added value to the existing surveying workforce.

When compared to graduates from on-campus programmes, graduates from distance education programmes have acquired the same technical knowledge and skills as well as a range of self management skills and, if they have been employed in the industry, a number of years of work experience.

The Disadvantages of Distance Education Programmes
From the student perspective there are many disadvantages in undertaking a distance education programme when compared to an on-campus programme. For example, students must develop independent learning skills and fit their studies into a busy schedule of family, work and other commitments. To be successful they must be self motivated and be able to manage their own learning. They obviously miss the face-to-face contact that is provided for on-campus students, although the introduction of email and other communication technologies has, in some ways compensated for this. In addition, in USQ’s distance education model students do have the opportunity to meet with lecturing staff during the residential schools.

From the industry’s perspective, it is likely that many feel that studying by distance education is a lesser experience than studying on-campus and perhaps even that the quality of the graduates is also lower. Whilst distance education students may miss out on many of the traditional extra-curricula activities that on-campus students can experience, it is likely that many contemporary on-campus students are also missing out on these experiences as they juggle part-time work and full-time study. In addition, graduates from a distance education programme who have worked in the relevant industry are likely to be much more job-ready than their on-campus counterparts.

Developing a Viable Distance Education Model for New Zealand
The New Zealand surveying and land information industry has an opportunity to develop and promote a distance education model that will offer equality of educational opportunity throughout the country and to all members of society. A model that would provide career development pathways that would enable members of the existing workforce to advance to their level of capability or comfort. A model that would recognise prior learning and experience by providing an appropriate level of cross-credits in higher level programmes. If such a model was to be developed it would ensure that the industry has a well trained and educated workforce to enable it to meet the future demands of an information rich society.

Obviously this would be a challenge for any industry, it is likely to be an even greater challenge for a small industry like the surveying and land information industry. This is because there are
many hurdles to overcome, for example:

Agreement must be reached on the programme(s) that should be offered by distance education;

The educational institutions involved will need to cooperate to ensure the existing, and any proposed programmes, are integrated to form a fully articulated model that would enable people to easily and efficiently pursue their career goals wherever they are in the country;

Any new programmes in the educational model must be recognised and accredited by the New Zealand Qualifications Authority before the educational institutions involved would gain access to government funding;

Any proposed distance education programme(s) must be sustainable in the long term as the development costs are high and, because of the part-time nature of such programmes, it takes time for the revenue stream to cover the initial outlays;

The distance education provider(s) must be able to dedicate an appropriate level of qualified staff, resources, multi-media production facilities and student support services to ensure that a high quality programme is delivered to students; and

Finally, for it to be viable, any proposed educational model must be supported by all sectors of the industry.

One model that could be investigated and adapted is that used to deliver a Bachelor of Engineering Technology by distance education in New Zealand. This model is described in the following section.

The TOPNZ - USQ Bachelor of Engineering Technology

In March 2001 the USQ entered into an agreement with the Open Polytechnic of New Zealand that would allow TOPNZ to offer USQ’s Bachelor of Engineering Technology by distance education throughout New Zealand. The jointly badged award means that students graduate from both institutions and, as the award is recognised in both countries, that they have a wider range of career options. The programme, which is accredited by both the NZQA and the Institution of Engineers New Zealand (IPENZ), has been offered since 2002 and has attracted a growing enrolment, with the first student graduating from the programme in May 2004. The programme has attracted a large number of students who wish to upgrade their NZCE. These students enter the programme with up to two years of advanced standing, depending upon their previous studies, the year they graduated, and their work experience.

Before a course is offered by TOPNZ the USQ study materials are reviewed by a New Zealand industry expert in the specific content area. The reviewer reports on the content and its applicability to the New Zealand environment and practice. The reviewer also identifies any information, such as terminology, legislation, codes and practice, which should be added to the materials to make them more relevant for New Zealand students. Content experts are then engaged to write New Zealand specific materials to ensure the programme is appropriate for New Zealand students. Where the New Zealand specific materials make up less than 10% of the course content they are normally blended with the USQ materials as examples of alternative practice, case studies, or notes. In this case both USQ and TOPNZ students study the material and gain knowledge of alternative practices. Where larger changes are necessary, such as in a structural engineering course that uses the New Zealand Standards, the two groups of students study the same theoretical content but then the New Zealand students use the New Zealand specific materials to apply that knowledge and gain experience in using the New Zealand Standards.

In New Zealand the courses are taught by TOPNZ staff, who also provide appropriate support
services to the students enrolled in the courses. In most courses New Zealand students also have access to the discussion boards and other online learning services provided in the USQ online environment. At the present time New Zealand students are attending the USQ Residential Schools associated with their Practice courses.

The New Zealand students in a course undertake the same assessments as the Australian students enrolled in the course in the same semester. The Assessment Scheme for a course is designed to ensure all students have an equal opportunity to demonstrate their achievement of the learning objectives for the course, regardless of where they are enrolled. The assessments submitted by New Zealand students are marked by TOPNZ staff, and then a sample of them are moderated by USQ staff.

If USQ was included in the distance education model for surveying technicians then one of the major obstacles to the development of such a model would be overcome. This is because the capital costs associated with developing and maintaining the study materials would be greatly reduced as the USQ’s existing study materials could be adapted for the New Zealand environment. It should be noted that more than a quarter of the courses in the USQ’s two-year Associate Degree in Spatial Science programme are already offered by TOPNZ as part of the Bachelor of Engineering Technology programme. This, together with its previous experience with surveying education, would suggest that TOPNZ should also be part of any proposed distance education model.

**Conclusion**

This paper addressed the need for a distance education programmes for surveying technicians in New Zealand by describing the characteristics of the current education programmes, the advantages and disadvantages of distance education, and the obstacles that will need to be overcome to develop and implement such programmes. Then some options were considered, such as USQ’s fully articulated model of spatial science programmes and the TOPNZ – USQ Bachelor of Engineering Technology programme.

There are many challenges to be faced if the New Zealand surveying and land information industry wishes to properly address this issue, for the development of an educational model will require careful planning as there are many stakeholders that will need to be involved in any decision making processes. At the present time there are more questions than answers, for example:

- Is there a viable market for distance education programmes in New Zealand?
- Which programmes should be offered by distance education?
- Can the TOPNZ–USQ model be adapted for the surveying and land information industry in New Zealand? The aim of this paper was to promote discussion on this important issue. Only time will tell whether that aim has been achieved.

**References**
