Educating surveyors: Some of the challenges

Maintaining a strong financial foundation, raising the academic entry levels, building research capability, maintaining an appropriate curriculum,...

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Over my nineteen years of employment in the School of Surveying at the University of Otago, I have had the opportunity of participating in three (formal) school curriculum reviews and three departmental reviews. I have watched the university change from its relatively quiet, conservative academic roots, to a more business-focused organisation and thence into an academic/research intensive organization, focussed on maintaining its status as New Zealand's top ranked university as measured by research quality.

During these same years, the surveying profession in New Zealand has also undergone substantial change. In 2001, the New Zealand Institute of Surveyors (NZIS) lost its statutory protection and become a voluntary organization able to make and police its own rules. New criteria for professional entry into the NZIS were developed, a new Cadastral Surveyors Licensing Board (with new professional examination criteria) replaced the old Survey Board of New Zealand, and a system introduced whereby members of the NZIS are required to demonstrate ongoing professional competency. Through all of these changes, there have been some fundamental challenges that seem to me to be an ongoing part of academic life in any professional school. They are challenges that seem to confront many university surveying programs in the world. These and the solutions that we have adopted are the subject of this article.

Establishing financial foundations

Maintaining a strong financial foundation is essential. By far the largest part of the School's funding (over 90%) is driven by the number of its Equivalent Full Time Students (EFTS). The School is a stand-alone entity within the Division of Sciences which itself is one of four academic divisions within the university. Although the base funding is not in a strict linear relationship to EFTS (the Division of Sciences "smooths" funding on a year-to-year basis), typically the more EFTS enrolled in papers taught within the School, the larger the base budget. In this type of funding regime, and because of the efficiencies able to be achieved, large undergraduate student classes provide the base cash flow upon which to build a financially successful department. This is one of the reasons why the School has chosen to make it a priority to attract high school students into its first year papers. The marketing momentum built up over a substantial number of years has been such that the School now typically attracts 100 or more students into these papers. This group of students then forms the competitive pool from which 60 are selected for entry into the second year of the degree. Over the last decade or more, the School has usually had 100 or more students in the first year of their surveying degree and 60 in each of the three subsequent years. Within the broader constraints due to the government-imposed changes on tertiary institutions, this has resulted in a very stable funding environment.

Raising the academic entry levels

The second challenge has been one of progressively moving the overall academic quality of the School's undergraduate students to higher levels. As implied above, once students have completed their first

year at university during which time they are required to successfully complete four specified papers (one of which is Introductory Surveying), plus three elective papers, they then apply for admission into the surveying degree program. Numbers at 100- level are unrestricted. Thus, the greater the number of 100-level students, the greater the competition for the 60 places available in the second year of the BSurv degree program. Over the last decade, the highest number of applicants for admission to the BSurv degree in any one year has been in excess of 120. That particular year, the average grade required for entry into the second year of the BSurv degree was between a B and B+, a level comparable to Otago's very competitive LLB program. In order to achieve competitive entry, the School has worked consistently and diligently on marketing a career in surveying to high schools throughout New Zealand. In this regard, it has been greatly assisted both by Otago University's high school's liaison officers and by the NZIS. One of my primary goals as Head of Department (HoD) was to ensure, firstly, that the School had excellent relationships with the liaison officers; secondly, that at least two pieces of new marketing information crossed the desk of every high schools career advisor each year and thirdly, that I would visit at least 5 –10 high schools each year, typically to take a senior mathematics class. The results speak for themselves – we know of no other surveying degree program in Australasia, the UK or North America that has the level of competitive entry found at Otago.

The School also offers a three-year BSc degree majoring in Land Planning and Development, as well as a four-year BAppSc degree in GIS. These degrees have no entry restrictions. A significant number of students not admitted to the four-year BSurv degree will move across to these degrees and either reapply for the BSurv degree a year later or move down a slightly different career path.

Building research capability

The third challenge has been that of building a high quality research capability whilst still maintaining a strong professional emphasis to the academic program. This challenge manifests itself in two different ways. In the first instance, it results in tension for staff members in the allocation of their time and in the second instance in the recruitment of staff.

The time allocation issue arises from the university's expectation of high quality research outputs from all academic staff. In the School's case, this is more heavily emphasised by virtue of the fact that the Division of Sciences is by far the most research intensive of the four academic divisions within the university, attracting the greatest number of research grants and generating the most high quality academic publications/staff member. Research expectations are high. Those periods of time outside the teaching semester when there is little or no student contact are prized. However, in order to meet professional expectations, Otago's BSurv degree program has a three-week field camp prior to the beginning of the 2nd year, a one-week camp at the end of the 2nd year and a three-four

week camp at the end of the 3rd year. Thus at a time when most other university staff are focused on their research, the surveying staff traditionally had to run field camps. The School has substantially overcome this problem by employing a small number of full-time Professional Practise Fellows for whom there is no research expectation. Over the last decade, it has been these, plus the School's technical staff which put in the hard work required to organise and successfully run the field camps.

The issue of staff recruitment relates largely to expectations from both the students and the profession. The ideal staff member in the School of Surveying at Otago will have a PhD degree, a capacity to develop and sustain a strong research program, good (real world) professional surveying experience and the ability to teach undergraduate and postgraduate students fluently and well. Such personnel are not easy to find! In order to help overcome this problem, the School has had some success in recruiting staff with Masters degree and then, as an expectation of employment, provided the necessary support for them to complete their PhD degrees. Having said this, the reality remains that professional schools have additional staff recruitment criteria that are not normally found in a pure academic department. The drive to have faculty who produce leading edge research to the detriment of almost every other criteria, seems to me as damaging and short-sighted, certainly from a professional point of view. I can think of instances (not in my own department, fortunately) where a staff member's research has been absolutely outstanding but where their ability to teach students has been dismal by any and every measure. In my view, this is unacceptable. It is here that strong representations from the surveying profession can make a difference. Otago has always taken the view that its flagship BSurv degree and the well-being of the School itself, are really a partnership between the university and the surveying profession.

Having recruited the appropriate staff and substantially resolved the time allocation issues, the subsequent challenge becomes one of attracting research capable postgraduate students. High quality research students are the lifeblood of university research programs. In the School's experience, the development of good postgraduate research program is a function of attracting high quality academic staff, helping them to develop an international research profile, good funding, marketing and easy to follow admission procedures. In many regards, the funding issue is perhaps the most crucial and it is here that a great deal of energy has been focused. In recent years, Otago University has introduced a large number of fully funded scholarships for students studying towards research based Masters or PhD degrees. The School has had considerable success in seeing its students win these scholarships. This has been a significant element in building research momentum. This momentum is a crucial early step in enabling staff to build their research profiles and thus attract their own research grants.

Maintaining an appropriate curriculum

In order to ensure that the curriculum remains up-to-date, the School undertakes periodic (formal) curriculum reviews. This has been done in conjunction with the surveying profession. In addition, it has a Board of Studies that meets at least annually and is comprised of both university staff and members of the profession. The Board will periodically review aspects of the course. Within these overarching processes, the school staff has the freedom to make informal curriculum adjustments on a semester-to-semester or year-to-year basis.

A second curriculum issue relates to the breadth of Otago's BSurv curriculum. The professional surveyor in New Zealand is a specialist in measurement science, land development (including subdivisional planning and engineering design) and cadastral studies. He/she will also require a good working knowledge of GIS systems and technology. Over time, various questionnaires have revealed clearly that there continues to be a strong demand for the high-quality 'general practice' type graduate Otago typically produces. In many ways, and from a global perspective, this is one of the distinctive features of an Otago graduate. This breadth of curriculum presents real challenges when it comes to designing course papers and fitting them into the standardised paper/degree system used at the University of Otago. Most papers are now expected to entail180 hours of total learning and be delivered in one semester. Because surveying students are funded by government for a four-year, full-time academic program, the length of the degree course is constrained. The School constantly looks for ways of engaging its students in practical, thought provoking learning exercises that link across papers and curriculum modules.

Concluding thoughts

In seeking to overcome the above challenges and create a thriving academic and professional program that is of a high standard of excellence, the School has sought to be cognizant of the thoughts of Hilborn and Howes (2004) ("Why many undergraduate physics programs are good but few are great", Physics Today, Sept. 2004). In their analysis of what makes the difference between a good undergraduate physics program in the United States, versus a great program (of which they found very few), they noted three primary characteristics. Firstly, a great program is challenging, supportive and encouraging and includes well-developed advising and mentoring systems, an undergraduate research program, plenty of informal staff-student interaction and a strong sense of community. Secondly, there is a widespread sense amongst the staff that it is their collective responsibility to maintain and improve the program. This brings with it continuous evaluation and experimentation. Such a department initiates reform efforts in areas of change that it sees as being of importance. Finally, such a program has a clear sense of mission and enjoys strong and sustained leadership.

These are all the characteristics that the School of Surveying at Otago University would aspire towards achieving both in the present and in the future.