Quantum leap for University industry collaboration

Understanding atmospheric chemistry
University-industry collaboration has in recent years become a catchphrase at The University of Wollongong. Justly so, for the University has established an enviable reputation in recognising the demand for close links with industry, particularly in the areas of technology and research and development. Evidence of this is to be seen in the formation of research centres within the ambit of the University. Each of these centres has a specific area of concentration. Each aims to develop products and processes which have direct applied and commercial application.

Two major initiatives which aid co-operation between industry and the University are: Wollongong Uniadvice Limited—the consulting and research company, which links the needs of the community with the academic and research skills of the University. And The Illawarra Technology Centre—an incubation facility which has as its primary focus the commercial development, manufacture and marketing of products and processes. The natural progression is to build on these initiatives by means of a purpose-built complex which can be used by the private sector to undertake research, design, development, engineering activities leading to manufacture. This process is now under way with the development of what is known as Campus East, or more accurately now, as the site of The University of Wollongong Business and Technology Complex—Phase II.

The advantages—and the promise—of such a complex are such as to take the breath away. The most obvious is the ease with which special projects can be instigated and for which support facilities are available in the University. Obvious examples which spring to mind are science laboratories, computers, specialised scientific equipment—and, of course, the major advantage of day-by-day interaction with the University community. Already moves have been made to attract overseas involvement in the complex. The University's Business Manager, Mr Jim Langridge, has made contact with business leaders in the US and Britain and inspected similarly based—and highly successful—facilities linked with universities in Scotland and England.

Site of the proposed complex, Campus East, is a satellite of the main campus. It comprises an area of 13 hectares, owned by the University. It is only minutes away from the Wollongong Central Business District, and main-road and rail links to Sydney—and as a plus for executives and their employees living at present in cold, grey-sky climates, the complex is close to some of the best beaches in Australia.

The combination of the site's physical advantages and the University's commitment to active co-operation with the commercial sector makes it more than an attractive proposition for any company considering expanding its operations in the Wollongong area, or entering it for the first time. In many ways the University has always been closely linked to business and industry. Initially it provided a centre of higher learning for the people of the NSW South Coast region, particularly serving the educational needs of those entering the industries which give the region its financial base—BHP's steelmaking plant and associated industries centred in the adjoining town of Port Kembla.

Wollongong has all the characteristics to foster economic development in new technologies. Far from being overshadowed because of its proximity to Sydney, Wollongong uses this apparent drawback and has achieved a steady increase in the pace of growth that has established it as one of the major engines of economic growth in the nation.

The City Council is anxious to facilitate new development, and with a strong and experienced Lord Mayor, has managed to attract a number of new building and industrial developments to the area. This is largely a result of strong co-operation between the City Council and those who seek to strengthen the city by taking their new developments to its environs. There is within the Council an economic development office to assist new industry. Recognising that time is a valuable commodity in the world of commerce, development proposals are considered without delay. These City Council attributes are strengthened by the active assistance willingly given by local members of the State and Federal parliaments.

Criteria for companies seeking to be located at the complex include the type of production technology of the firm (eg, no heavy or large-scale manufacturing on site); the sophistication of the technology base of the firm (eg, computer and electronic products manufacture, software development, research divisions of pharmaceutical firms, genetic engineering); government regulation on environmental factors; existence of complementary or related industries in the region; availability of skilled and unskilled labour in the region; the professional and academic expertise associated with the complex and whether industry activity is matched by an appropriate discipline in the University.

Finance and management

The University of Wollongong will manage the complex through a University Corporation with representatives of other interests on the Board of Directors. Parcels of land will be leased into company or joint-venture structures to allow a variety of means of financing and constructing buildings. Buildings will be provided by grants from governments (federal, state or local), a combination of grants and loans, joint or private ventures. As well as housing research and development facilities the complex will offer a full conference centre and hotel facilities. These will complement the School of Tourism which will be established as part of the complex.

Development of the complex is supported by all levels of government and private industry.

Benefits to companies

The manifold benefits to companies which decide to participate in the project are many. The costs involved in obtaining access to scientific libraries and specialised equipment are high and may otherwise be quite uneconomic for individual organisations. Such costs can be reduced markedly through involvement in such a complex; co-operative research in specific areas can reduce such costs even more.

Co-operative efforts act to stimulate technologists in the performance of their work, thus providing an increase in the quantity and quality of results obtained. Participants in the complex will be in a unique position in being able to access expertise through the personnel available within the University—staff and students. Companies will therefore be able to identify the most promising postgraduate and undergraduate students—a factor which
Architect's drawing of the proposed Business and Technology Complex at Campus East

will place them in a favourable position to recruit graduates.

The access which company staff will enjoy, in relation to the sporting, social and cultural activities of the University community, provides a much more stimulating and enjoyable work environment than would be possible in other situations. Such informal contact also helps company staff to keep informed of the most recent advances in their fields.

It will be a culmination of the initiatives undertaken in an effort to develop and maintain links between the University, business and industry. It is in the best interests of all parties involved (and the nation) for enhanced co-operation in all areas of research and development.

Benefits to the University

Although an economical rent will be charged, the income is not the reason for the establishment of the complex. The presence of companies and their staffs broadens the horizon of academic life. It will help maintain a close understanding between the University and industry, so benefiting teaching programs, in both type and content, and at undergraduate and postgraduate levels. As the relevancy and applicability of teaching programs are maintained, the University will benefit by attracting the brighter students, thus further enhancing its reputation.

The University may also benefit by expanding its involvement with the private sector in joint research programs and in the area of contract research. Such involvement provides a stimulus to academic staff to maintain an edge on the academic enterprise. And this aids both their teaching and their motivation in identifying areas of research which have direct industrial applications. It also helps in the identification of applied problems which require further research.

The reciprocal actions of non-academic staff being exposed to seminars and lectures on the latest developments in their areas, and the possibility of guest lectures being given by staff from private enterprise to reveal different points of view and experience, also benefit the University as a whole.

The opportunity to make a positive contribution towards the University and industry presents an exciting ideal and is to the clear benefit of both.

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The University of Wollongong will pay graduate tax for meritorious students

The University of Wollongong has announced yet another move, in a package of initiatives, to attract students from diverse backgrounds and having varied talents.

The University will undertake to pay the graduate tax charge for those students who are awarded meritorious scholarships—to study in one of the University’s Faculties.

The Meritorious Scholarship Scheme was introduced in 1987 and is offered on the basis of the trial Higher School Certificate results.

Recipients of an award to begin studies in 1989 will receive

- Free accommodation at a University residence—approximately $3880 a year.
- Payment of University Union, Recreation and Sports Association fees—some $270 a year.
- Prepayment by the University of the graduate tax—some $1,530 a year. Total value—approximately $5,680.

The benefits will continue each year of the course, while the meritorious student is performing satisfactorily.

Applications were received last year from all over NSW, as well as from other states. Recipients of the scholarship had aggregates in excess of 400.
Courses for tomorrow's high fliers

University enters into joint venture for commercial fee-paying Institute

The University of Wollongong and a large finance-sector corporation—Computations Pty Ltd—have agreed in principle to a joint venture to form a commercial fee-paying training institute to promote four levels of education and training for finance-sector personnel—tomorrow's high fliers in the big financial corporations.

The institute is to be known as the Computer and Management Training Institute. They will control the administrative and commercial aspects of the venture.

The proposal is funded by either student fees or corporate sponsorship/scholarship; i.e., all activity will occur by specific full cost additional funding to the School and to the Faculty.

Behind the venture in the University are Mr. Ian Carter, general manager of Wollongong Unilifice Ltd., the research/consulting arm of the University, and Dr. Michael Hough, head of the School of Administrative Studies. They will control and accredit all the Institute's education and training programs and recruitment.

An Australian multinational, Computations designs and implements business systems for the international financial services industry. It has recognized that growth in their area was stifled because of shortages of skilled people. Four levels of training will be provided:

Outlook is for dynamic period of further growth...

by the Vice-Chancellor

The Australian higher-education system is in the middle of one of the more dynamic periods of its history. The major changes foreshadowed by the federal government, first in the Green Paper (November 1987) and subsequently confirmed in the White Paper (August 1988), continue to be hotly debated, while the federal government and some state governments are moving on reform agendas.

Some aspects of the federal proposals have not provoked debate. Elimination of the artificial binary divide between universities and colleges will not cause many regrets, although there are very real distinctions between institutions which must not be glossed over. To equate many of the colleges with universities, as some have tried to do, would inevitably result in a weakening of the system.

Likewise the substantial increases in funding achieved by the federal minister, Mr. Dawkins, in the August 1988 budget will allow growth at reasonable per student rates rather than the marginal dollars of recent years. The scarcity of capital funds which has so hampered higher-education development has been overcome with a generous allocation of funds for the 1989-91 triennium.

The government wants to see another round of amalgamations, roughly halving the number of institutions. Some amalgamations are sensible. There has been little rationale for two higher-educational institutions in places such as Armidale and Newcastle, and presumably they will have to amalgamate. The proposals do not affect Wollongong, which is already of a reasonable size (approximately 8,000 students; 6,200 EFTS) having amalgamated with the Wollongong Institute of Education in 1982 and expanded very rapidly since. In any case the only sensible possibility would be amalgamation with our nearest neighbour, the Macarthur Institute, which has a great desire to develop on its own.

Unless the state government, which controls the legislation governing both institutions, decides to give a push to amalgamations and forces the issue, it is unlikely that either institution will be affected. Wollongong has not had any overtures from federal authorities concerning amalgamations and, accordingly, is not expecting any pressure for change.

The University will continue to grow and diversify during the 1989-91 triennium. Recent discussions with Department of Employment, Education and Training officials resulted in planning for expansion of 450-500 EFTS during the triennium, almost exactly in line with our own wishes. Federal officials have pencilled in costings for these extra students at satisfactory rates and have indicated that a beginning will be made towards redressing the gross underfunding which Wollongong University has suffered for over a decade. The proposals do not go far enough as the University has been more than 13 per cent under-funded.
Gift of Japanese works of art

Professor Howard Worner, CBE, Director of the Microwave Applications Research Centre at the University, has presented the University with a superb collection of Japanese works of art.

The collection includes prints and original works by leading Japanese artists from the 18th century to contemporary times. Most of the works were presented to Professor Worner—an admirer of oriental art—during his term of office as the Chairman of the Victorian Brown Coal Council.

The exquisite nature of the collection is an indication of the high esteem in which he was held by the Japanese.

Professor Worner is interested in contributing to other aspects of the University community apart from science and engineering. He is, of course, playing a pioneering role in the development of microwave energy. And he is also providing funds for an annual sculpture competition, with the winning works to be permanently displayed on the campus.

During the month of August, Professor Worner received honours for his work in two widely differing fields. On August 15 the Newcastle Branch of The Australasian Institute of Mining and Metallurgy conducted a 'Howard Worner Symposium' to recognise Professor Worner's contributions to advances in pyrometallurgy (high-temperature smelting and refining). One hundred and twenty-four metallurgists from all over Australia attended, many of them former students, colleagues or associates of Professor Worner. This is only the fifth time that a symposium has been named in recognition of a living metallurgist.

On August 31 a similar function was held in Melbourne to pay tribute to Professor Worner's initiative of research in this country into dental and surgical materials. The pioneering work began in 1938 in the Metallurgy and Dental Schools of the University of Melbourne.

Professor Worner has been awarded the Allan Docking Medal of the International Association for Dental Materials Research.

Professor Howard Worner at the presentation ceremony with part of his valuable collection (picture courtesy The Advertiser)
The greenhouse effect, stratospheric ozone, acid rain; 15 years ago, these words meant nothing to anyone but a small community of atmospheric scientists. Nowadays they are words on everyone's lips, concerns being discussed in public, political and governmental forums at all levels. How much hotter will the earth become? By how much will the sea level rise? What will be the effects of these changes? Will the Antarctic ozone hole grow? Is there an Arctic ozone hole? What should we do about chlorofluorocarbons? Does Australia have an acid rain problem? Is nuclear winter really a threat? And perhaps most importantly, what can we do about it?

There is no doubt that these are changes to our planet which we ourselves have brought about, through increasing population and industrial activity. They will not go away, so we had better know what we are doing. Until 1970, atmospheric chemistry was of interest to a handful of academic scientists. Then the potential threat to the stratospheric ozone layer from high-flying supersonic aircraft was recognised, and atmospheric chemistry research has never looked back. The task is to understand the chemistry of the atmosphere; it is a big task, and despite nearly 20 years of increasingly intensive international research we still do not have all the answers. But we need them if we are to manage our planet and our atmospheric environment properly.

Understanding atmospheric chemistry requires that, for each chemical species, we know all about how it gets into the atmosphere, what chemical transformations it undergoes, how it is transported around by the general circulation, and how it is eventually removed. Although the atmosphere is over 99 per cent nitrogen, oxygen and argon, it is the rest, the trace gases, which determine the chemistry, and there are hundreds of them. We now have a fairly good idea of the overall structure of atmospheric chemistry, but issues such as the Antarctic ozone hole serve to illustrate that we still have a way to go.

We burn so much fossil fuel each year that atmospheric carbon dioxide levels are measurably increasing; this is the primary cause of the greenhouse effect. But globally there is almost as much other biomass, matter derived from living and recently dead plants, burnt annually in agriculture, deforestation, bushfires and waste management. These fires inject not only more carbon dioxide, but also a vast array of other chemical species into the atmosphere.

In the Chemistry Department at The University of Wollongong research in atmospheric chemistry is centred on measurements of the chemical composition of the flames and plumes of biomass fires such as bushfires. From these measurements we can assess the impact of biomass burning both on local atmospheric pollution and on the global budgets of trace gas species.

These measurements are carried out predominantly using an analysis technique which we have developed ourselves based on state-of-the-art Fourier Transform Infrared (FTIR) spectroscopy. Samples are first collected in the field by trapping and freezing out the trace gases in the air at liquid nitrogen temperature (\(-196^\circ C\)). This effectively collects most species of interest while not allowing them to react further with each other.

The sample, still at \(-196^\circ C\), is then analysed with the highly sensitive FTIR spectrometer. This technique can measure a wide range of species whose concentrations are only one part in 10,000,000,000 or less in the atmosphere.

The Department's research interests extend also to the development of other new and powerful techniques for atmospheric trace gas analysis based on the use of modern spectroscopic methods such as FTIR. Perhaps the most interesting of these is FTIR emission spectroscopy, in which the heat radiated by a hot flame or plume is analysed spectrally to determine its composition. This is a remote sensing technique, which has the great advantage that a fire or plume can be studied from afar, without any need to dive into the fire to collect samples, and no interference in the sample itself. In the coming year we hope to test out this technique on some real (but controlled) bushfires.

\>(Dr) David Griffith
Department of Chemistry

**AN OUTSTANDING SUCCESS**

Open Day at Wollongong University—on Sunday August 28—was by any standard a total success. The event attracted an estimated number of between 9,000 and 11,000 visitors. While Open Day traditionally draws large contingents from Sydney, the \(tout \text{ ensemble}\) from the State capital appeared on this occasion even stronger than usual.

Many of the influx were tourists, not all of them accompanied by their parents, and come to Wollongong to research the University as a potential place for tertiary study.

The staff of four at the Course Inquiry Centre in the Administration Building were besieged, working with their backs to the wall, dealing with inquiries from potential students. The queue started forming at nine o'clock and there was no slack-off until five o'clock. Many of the potential students were from Sydney, the Riverina, the ACT and the South Coast.

Nor could a single visitor have gone away disappointed. The day's program of events was well planned, and undoubtedly interesting to potential students, their companions and parents. Full marks must be awarded to University staff for the impression they conveyed—an impression of friendly caring and of interest and enthusiasm for what they were doing.

Variety was endless, from recitals of Chopin by the Chopin Society, and a performance by Don Harper's Big Band in the Union, demonstrations of theatre, film and television by the English Department, to robots at work on the students of tomorrow.
The man who wants to change the way our children learn to read and write, Associate Professor Brian Cambourne, grimaces now when he recalls how he used to teach spelling. 'I'd take ten to 20 words and spend 20 minutes a day drilling them into the children. I remember after what I thought was a really good spelling lesson saying in the staff room: "I really pounded the words into the kids' heads." I never worked out why the children got almost perfect marks in dictation tests but seemed continually to mis-spell the same words in other writing.'

Now Professor Cambourne, head of Wollongong University's Centre for Studies in Literacy, guides teachers in methods based on different premises. His techniques are now based on the theory that children should learn to read and write in much the same way as they learn to speak; by being surrounded by written words, by receiving demonstrations of how reading and writing are done, by being encouraged to "engage" themselves with what they are thinking about, by experiencing the environment.

Professor Cambourne worked out a little of what he called 'engaging'; he translated the three reasons he found for children not learning to spell correctly into new methods of teaching. He identified a set of principles underlying how children learnt to talk. They then isolated the factors and tried to put them together in a way teachers could understand.

The theories made sense to education authorities, who began to put them into practice in classrooms—but among some groups they created a furor. Professors Cambourne and his colleagues have conducted a lot more "on-the-ground" research. His techniques are now based on the theory that children should learn to read and write in much the same way as they learn to talk. It is all to do with what he calls 'engaging'; when a teacher demonstrates something, a pupil may not learn if it doesn't seem worth doing.

Professor Cambourne worked out a little of his theory of why people do not 'engage' staring out his office window at the hang-glider pilots who used to jump off Mt Keira. Although he thought they were spectacular, he was not interested enough to want to do it himself and could not concentrate enough to notice how a hang-glider was built or how it worked.

He translated the three reasons he found for not 'engaging' himself to why children may not learn to read and write effectively. 'They don't see themselves as potential readers or writers. They are not convinced it will further the purposes of their lives—some Aboriginal communities are not convinced that white man's literacy will further the purposes of their lives. They don't see themselves as potential readers or writers.'

"They don't see themselves as potential readers or writers. They are not convinced it will further the purposes of their lives—some Aboriginal communities are not convinced that white man's literacy will further the purposes of their lives. They don't see themselves as potential readers or writers."
To study eye technology

Senior Lecturer in the Department of Chemistry, Dr Roger Truscott, has been awarded a prestigious grant from the Royal Society and the Australian Academy of Science. The grant has enabled Dr Truscott to visit the University of East Anglia later to learn the technique of human lens organ culture, work which has been pioneered by Dr George Duncan in the Department of Biological Sciences. The technique allows the study of lens metabolism in lenses extracted from patients suffering from cataract. Senile cataract is a common disease in elderly people. It is characterised by a clouding of the lens of the eye which impairs vision and can lead to blindness. There is at present no known way of preventing cataract and no cure other than surgical removal of the lens.

New learning initiative for the region

Centre for the teaching of English to students from overseas countries has been established in The University of Wollongong. Its (rather tautological) title is ‘The Wollongong English Language Centre in The University of Wollongong’.

The Centre’s Managing Director is Professor Peter Rousch, a Deputy Vice-Chancellor of the University and, appropriately, an acknowledged authority in the teaching of English. Professor Rousch is, for example, a consultant to the International Development Program on Teaching English as a Second Language. He has been a consultant to the Australian Vice-Chancellors’ Committee on English Language Teaching in South-East Asia. And, added to this, Professor Rousch has made many visits to overseas countries—particularly to South-East Asia—so that he has what might well be a unique understanding of the needs of language learners from our near-neighbour countries.

Students will have access to the University’s modern library and Curriculum Centre. The most relevant and modern methods of instruction will be used, with particular stress on reading, writing and listening. The Centre is being operated by Wollongong Uniadvice Limited.

Work begins on University theatre

Work has begun at the western end of the University campus on a theatre which will be a top technical teaching space for the School of Creative Arts. It will also serve as a versatile performance and exhibition area for the University and local community.

The technical equipment to be installed will enable students to go into any theatre and not be surprised. Designed to seat 100 people, the space can be converted into either a proscenium-arch theatre or a theatre-in-the-round, or seats can be quickly packed to provide an exhibition space or practice area. The building will be linked to the existing music auditorium by a common foyer. In spite of scarce resources, architects Graham, Bell and Bowman and the University’s Buildings and Grounds Department have ingeniously extended existing facilities to produce a flexible multi-purpose complex. And since no single area can cater for the diverse needs of modern theatre, this complex will complement the Illawarr Performing Arts Centre and Theatre South’s Bridge Street Theatre, which students will continue to use.

Approximately 80 per cent of all people aged 65 and over have some form of cataract. More than 500,000 cataract operations are performed each year in the USA. Each operation costs between $10,000 and $15,000. The National Institute of Health (USA) estimates that if a therapy could be discovered which simply delayed the need for surgery by ten years, the saving would be in excess of US$600 million a year in medical costs alone. With an increasing proportion of elderly people in the population this disease will assume an even greater importance in the future.

Dr Truscott’s laboratory is the only one in Australia which is trying to discover the cause of senile cataract. The basic approach is to compare normal and cataract human lenses at the molecular level. Some of the research is performed in collaboration with Dr Stephen Pyne’s group in the Department of Chemistry. Close links are maintained with the Department of Clinical Ophthalmology, The University of Sydney, and the ‘Save Sight and Eye Health Institute’ headed by Professor Frank Billson. Human lenses are provided by the Sydney Eye Hospital and the Illawarra Private Hospital.

The research on senile nuclear cataract is supported by a grant from the National Health and Medical Research Council of Australia.

Dr Truscott in his laboratory