

6 March 2001

Ms Jane Vincent  
Secretary  
Trade Sub-Committee  
Joint Standing Committee on Foreign Affairs,  
Defence and Trade  
Parliament House  
CANBERRA ACT 2600

Dear Ms Vincent,

On behalf of the University of Melbourne, I thank you for the extended opportunity of providing a response to the Inquiry into ***Enterprising Australia – Planning, Preparing and Profiting from Trade and Investment*** conducted by the Joint Standing Committee on Foreign Affairs, Defence and Trade (through the Trade Sub-Committee).

This submission to the Inquiry by the University of Melbourne focuses on the following Term of Reference:

*The adequacy of a skilled workforce in Australia particularly in new growth areas such as, though not limited to, financial services, information technology, E-business, education, pharmaceuticals and health care, and the competitiveness of that workforce.*

Within this Term of Reference, the areas on which the University has concentrated are:

1. Pharmaceutical Industry
2. Information Technology, Information Systems and E-Business
3. Competitiveness of the Australian Workforce

A summary of the recommendations related to these areas is provided followed by a general discussion section.

## SUMMARY OF RECOMMENDATIONS

### ***IT IS RECOMMENDED THAT:***

#### **1. For the Pharmaceutical Industry**

- (a) ***The number of Pharmacology PhD graduates be doubled through predominantly a doubling of scholarships available specifically to the discipline.***
- (b) ***A concerted effort be undertaken to communicate opportunities at school leaver level to help ensure that the most able students consider a career in research, together with increasing the value of stipends to attract and maintain these students.***



## **Developments for Consideration in Relation to Areas of Expansion During Demand for Graduates**

Increases in the following activities will create demand for graduates with training in a variety of Biomedical Sciences, with both generic and discipline-specific training being required:

- Venture capital investment in biotechnology-related fields;
- Start-up activity with new intellectual property;
- State government-based biotechnology initiatives;
- Expansion of industry research base (tax incentives for new research/cost-competitiveness and quality of Australian research).

### **Areas of Opportunity for Pharmacologists**

- Impact of genomics on drug discovery process;
- Impact of combinatorial synthetic and analytical processes;
- High throughput analysis of natural products.

***It is foreshadowed that there will be a more specific need to increase the number of Pharmacology graduates at the PhD level to meet this increase in demand which is being driven in large part by the pharmaceutical industry and is related to all aspects of drug discovery and development.***

### **Responses to Predicted Increased Demand for Graduates**

The major area of need for the predicted expansion of the workforce is in the provision of increased numbers of PhD graduates. The current research-based approach is considered to meet the training level needs of employers in relation to discipline-specific positions.

It seems likely that there will be an increased demand for graduates with 'literacy' in both Commerce and Pharmacology. The numbers of students undertaking double degrees have expanded in the last decade. Most of these graduates do not proceed to research careers. However, undergraduate training in Pharmacology does not equip the Commerce graduate with the essential direct bench research experience. The lack of empathy that this produces will influence adversely the capacity of such graduates to make research-related management decisions. ***It is contended that this creates a deficiency in the workforce that would be exposed by the predicted expanded activity in health areas if not redressed immediately.***

### **Approaches to Increase Numbers of PhD Graduates in Pharmacology**

#### ***Undergraduate Program***

- Compete within Science/Medicine Faculties for larger numbers of students
- Create more funded places in science courses

Encourage interdisciplinary studies with particular emphasis on

- Double degrees: BComm/BSc & BEc/BSc
- Double majors: Chemistry/Pharmacology  
Pharmacology/Biotechnology

#### ***BScHons Program***

The Honours year is the gateway to PhD training for the majority of candidates. Currently, competition for places in the Honours program results in large numbers of qualified candidates not gaining a place. Moreover, *no more than* the top third of students undertaking Honours will be competitive for commonwealth-funded PhD stipends. The top two-thirds of the Honours class reaches a standard considered by this University to be compatible with PhD training programmes, but only half of these are awarded postgraduate scholarships.

## **PhD Program**

There is merit in increasing the number of students undertaking research higher degrees in Pharmacology to improve the skills of senior managers who are required to make decisions regarding the future directions of the industry.

For example, the PhD program offered in the University Department of Pharmacology places emphasis on producing graduates who are skilled and knowledgeable in the following areas, as well as achieving international standard in their specific research area of endeavour.

- Ethics;
- Statistics;
- Communication - written and oral to lay and technical audiences;
- Critical evaluation - literature and data;
- Team work;
- Problem solving;
- Innovation;
- Experience of Industry collaboration - for example, through the Australian Research Council Australian Postgraduate Industrial Awards.

Accordingly, ***it is proposed that:***

1. A doubling of Pharmacology PhD graduates would be achievable with a doubling of scholarships available *specifically* to this discipline.
2. Increasing the value of stipends to attract and retain the best students and communicating opportunities at school leaver level will help ensure that the most able students consider a career in research.

## **2. INFORMATION TECHNOLOGY, INFORMATION SYSTEMS AND E-BUSINESS**

In order to achieve wealth generation from trade and investment perspectives, the focus needs to be on high levels of integrated skills combining Information Technology (IT), management and business development with high levels of technical skills.

The levels of IT technical skills taught in many Australian universities are generally comparable with our major trading partners: perhaps slightly lower than the US, comparable with Europe on standards and superior to many other countries.

***To raise the standard in Australia would require a lowering of the student-to-staff ratio and more time for staff development in research and linkage to industry.*** It is difficult under current constraints to both increase throughput and increase the skills level. Under current funding arrangements, there is a real possibility that Australia will move backwards relative to our major trading partners unless resources are increased and strategies re-assessed. The rate of change of technologies and thinking in the high growth areas is such that a high degree of time flexibility is needed to respond within a short time-frame.

### **Adequacy of the Human Resource**

The *Innovation Statement* may help both in absolute terms and on sensible time-frames in the longer term, however, **it is essential that a focus in the short-to-medium term on up-grading skills and re-education be given an immediate priority.** The implementation of a Government-sponsored loan scheme for post-graduate coursework candidates should assist. Further Industry-Based Learning Schemes are desirable.

Highly skilled graduates, while a necessary part of the investment strategy, are not sufficient to make a difference. There is a need for a strong industry-university interface and effective mechanisms to facilitate service and product development and export from Australia.

Australia has a very high trade imbalance for IT-related goods and services. Qualified graduates tend (with a few notable exceptions) to go into companies that have a support/branch office focus. Consequently, large scale product and software development opportunities are few. **This is an area of comparative industry weakness.** Australian graduates do not gain experience in key areas such as large scale project management and systems development, in commercialisation, and in large scale systems integration.

In the area of E-business, Australia's performance is somewhat better as the 'think global - act local' paradigm is utilised to innovate and conduct business development in the context of local industry and commerce. However, this does not easily drive investment in new industries nor lead directly to new exports.

### **Future Prospects**

The experience of some IT staff within the University over the past few years, through the successful winning of contracts in the areas of Information Technology, Information Systems (IS) and E-Commerce predominantly with US companies, indicates that Australia has a clear cost advantage (at equivalent skills clusters) over the US of about 2-3:1 for labour costs. Except as mandated as contract offsets, it has proved to be very difficult to secure software development contracts on reasonable financial terms, or to secure work above basic contract programming. Part of this difficulty is due to perceived communication or integration issues and part to the specific experience gap (with large scale activities) noted previously.

To facilitate increased trade and investment in IT- and IS-related goods and services, **it is necessary** to provide incentives to encourage local companies (and multinational offshoots) to conduct more of their business and product development in Australia. The problem is not uniquely Australian; Israel, for example, encourages international investment (through listings and Agreements) in IT and IS to support research and development in Israel – with sales and marketing arrangements following market forces.

### **3. COMPETITIVENESS OF THE AUSTRALIAN WORKFORCE**

It is being recognised that the globalisation of the world economy which started to occur in the mid-to late-1980s is having a fundamental impact upon the current and future prosperity of Australia, the key elements being the value of the Australian currency, the competitiveness (and indeed viability) of Australian industries and Australia's attractiveness to domestic and overseas investors.

As labour markets become more globalised, many aspects of employment (availability, security, remuneration, skills) are perceived to be changing rapidly. The understanding of the impact which these factors have upon the changing patterns of employment, is facilitated by studies<sup>1,2</sup> which place the Australian labour markets in the context of global labour markets.

#### **Notable Trends**

One study<sup>1,2</sup> which encompassed a period of fourteen years employed '*an occupational classification based on a conceptual framework ... that explicitly links occupations to the nature and extent of their exposure to global market forces*'. The taxonomy of occupation types developed for this study comprised a categorisation matrix combining the level and nature of skills and the degree and nature of exposure to global labour market forces (resulting in nine distinct categories).

Three broad trends emerged from this investigation.

The most positive and encouraging trend indicated that a large and strongly growing section of the Australian labour force - those providing *symbolic analytical services (conceptual and technical)* such as scientists, engineers, financiers, IT experts, artists and engineering associates and laboratory technicians - was interacting successfully in global labour markets. Whilst low

levels of participation by young people (under 25 years) was noted for both this category of occupation and to the *in-person service (professional)* category (involving medical practitioners, barristers, solicitors and social workers), it was suggested that greater participation in full-time education and training and the lengthening of education and training programs relating to both categories were responsible.

The two less positive trends indicated that:

- The largest section of the labour force was still employed in occupations categorised as high- and low-skilled *routine production services* (tradespersons, clerks, office workers, machinists, operatives and drivers) which were most vulnerable to global competitive forces; and
- Low-skilled jobs which had minimal interaction with the global labour force were growing rapidly.

***It is recommended that:***

***The growing awareness that employment in Australia is increasingly the outcome of global labour market interactions, not just local or regional considerations, be translated into education and training policy and planning to provide sectors of the Australian workforce with the skills to succeed in a globalised labour market.***

#### 4. CONCLUSION

The University of Melbourne **would urge** the Inquiry to recognise, in addition to any of its findings related to specific skills in new growth areas, the importance also of a strong general education to encourage breadth of understanding, sensitivity to cultural difference and creativity. Australia must follow the lead of countries such as Ireland and Singapore and ensure that educational and research policies recognise that narrow specialisation is ill-suited to creativity and enterprise. Both Ireland and Singapore have educational policies designed to sustain and develop core disciplines including those in the humanities and social sciences.

Should you wish to discuss these matters further, please contact my Office on telephone number (03) 8344 4179.

Yours sincerely,

Professor Frank P Larkins  
**Deputy Vice-Chancellor (Research)**

cc. Professor A.D.Gilbert, Vice-Chancellor, The University of Melbourne  
Dr M.R. Emison, Director University Planning Office, The University of Melbourne

**REFERENCES:**

1. Leo Maglen, *Australia in the Emerging Global Knowledge Economy: Changing Employment Patterns - 1986-7 to 1999-00*, Centre for the Economics of Education and Training Project 2000-2, Report to the Australian National Training Authority (January 2001).

(The Centre for the Economics of Education and Training is funded by the Commonwealth Government through the Australian National Training Authority as a Key Vocational Education and Training Centre.)

2. Leo Maglen and Sonnie Hopkins, *Australia in the Emerging Global Knowledge Economy: Changing Employment Patterns - 1986-7 to 1999-00*, Working Paper No. 32 (October 2000).