



COMMONWEALTH OF AUSTRALIA

Proof Committee Hansard

**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON INDUSTRY, SCIENCE AND
INNOVATION

Reference: Research training and workforce issues in Australian universities

WEDNESDAY, 18 JUNE 2008

CANBERRA

CONDITIONS OF DISTRIBUTION

This is an uncorrected proof of evidence taken before the committee. It is made available under the condition that it is recognised as such.

BY AUTHORITY OF THE HOUSE OF REPRESENTATIVES

[PROOF COPY]

INTERNET

Hansard transcripts of public hearings are made available on the internet when authorised by the committee.

The internet address is:

<http://www.aph.gov.au/hansard>

To search the parliamentary database, go to:

<http://parlinfoweb.aph.gov.au>

HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON INDUSTRY, SCIENCE AND INNOVATION

Wednesday, 18 June 2008

Members: Ms Vamvakinou (*Chair*), Fran Bailey (*Deputy Chair*), Mr Bidgood, Mr Champion, Mr Cheeseman, Dr Jensen, Mr Johnson, Mr Ramsey, Ms Rishworth, Mr Symon

Members in attendance: Fran Bailey, Mr Champion, Mr Cheeseman, Dr Jensen, Mr Ramsey, Ms Rishworth, Mr Symon, Ms Vamvakinou

Terms of reference for the inquiry:

To inquire into and report on:

1. The contribution that Australian universities make to research in Australia, including:
 - The contribution of research training programs to Australia's competitiveness in the areas of science, research and innovation;
 - The effectiveness of current Commonwealth research training schemes; and
 - The adequacy of current research training schemes to support Australia's anticipated future requirements for tertiary-qualified professionals in a wide range of disciplines.
2. The challenges Australian universities face in training, recruiting and retaining high quality research graduates and staff, including, but not limited to:
 - Adequacy of training and support (including income support) available to research graduates in Australia;
 - Factors for graduates that determine pursuit of a career in research;
 - Opportunities for career advancement for research graduates and staff;
 - Factors determining pursuit of research opportunities overseas;
 - Australia's ability to compete internationally for high quality researchers; and
 - Whether Australia's academic workforce is ageing, and the impact this may have on Australia's research capacity.

WITNESSES

BELL, Professor Sharon, Board Member, Council for the Humanities, Arts and Social Sciences, University of Canberra	13
GASCOIGNE, Mr Thomas Humphrey (Toss), Executive Director, Council for the Humanities, Arts and Social Sciences, University of Canberra	13
HUGO, Professor Graeme John, Council for the Humanities, Arts and Social Sciences, University of Canberra	13
KUCHEL, Professor Philip William, Secretary, Science Policy, Australian Academy of Science	1
LAMBECK, Professor Kurt, President, Australian Academy of Science	1
MEEK, Dr Sue, Chief Executive, Australian Academy of Science	1

Committee met at 10.07 am**KUCHEL, Professor Philip William, Secretary, Science Policy, Australian Academy of Science****LAMBECK, Professor Kurt, President, Australian Academy of Science****MEEK, Dr Sue, Chief Executive, Australian Academy of Science**

CHAIR (Ms Vamvakinou)—I declare open this public hearing being conducted by the House of Representatives Standing Committee on Industry, Science and Innovation into research training and workforce issues in Australian universities. The inquiry arises from a request of this committee by Senator Kim Carr, the federal Minister for Innovation, Industry, Science and Research. Written submissions were called for and 71 have been received to date—and we expect more—which will certainly keep us very busy. We are now conducting a program of public hearings and inspections and this hearing is the first in that series of inquiries.

Firstly, we have representatives from the Australian Academy of Science to give evidence. Although the committee does not require you to give evidence under oath, I should advise you that these hearings are formal proceedings of the parliament. Consequently, they warrant the same respect as proceedings of the House itself. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. We thank you for your submission and now welcome you to make a brief opening statement before we proceed to questions.

Prof Lambeck—We welcome the opportunity to speak to this committee to elaborate on our submission, which you have no doubt read attentively. The academy believes that the conduct of quality and innovative research in our universities is the core of Australia's long-term future welfare. We really believe that without a strong research base in our universities the future for this country would be very different indeed.

Currently Australia contributes about three per cent to the global knowledge base in science and technology and most of this research is actually done in the universities. The real challenge that we have is to be able to access the other 97 per cent of global research in a timely fashion so that we can adapt it to Australia's needs, add value to it and carve out niche markets. Our aim is to establish or to see a system in which, by making our own contribution to the global knowledge base, we can capture the other 97 per cent and use it to the nation's advantage.

We cannot predict what the principal developments are going to be in the next decade or so in science and technology or in fact in anything to do with research. Trying to pick winners is a difficult task indeed. We can only attempt to do so if we have a very broad based research capability in the first place, one that leads the world in some areas and in other areas where we will be able to lead in the future, so that at least we can understand what is going on around the world, capture that and bring it back.

We believe that our current contribution to global knowledge is under threat. That is not necessarily because our own effort is declining; the importance of funding basic science and research is being recognised and is being developed in the rest of the developing world, and even

if we stay steady in our productivity our contribution to the global effort will decrease simply because there will be many more partners. We need only look at what China is doing and putting into it. We should be very concerned about this. We believe the expansion of our broad basic science capability is essential if we are to retain our share of the contribution to global knowledge.

This increased international competition, perhaps paradoxically, means that we must be well integrated into the global effort to access the national and multinational research efforts elsewhere. We have to be able to make contributions to these programs on equitable terms. This means equitable in terms of intellectual and financial contributions. For many years Australian scientists have been able to take advantage of their intellectual contributions without perhaps making the due financial contributions to the efforts, but as the competition increases this will become increasingly difficult to do. In this regard—and it is not for me to tell the committee what to read—it may be appropriate to have a look at the 2006 Prime Minister's Science Council report on the importance of globalisation of science and what needs to be done for Australia to be better integrated into this.

Carrying out research and supporting research in the university laboratories alone is not enough if it is not accompanied by expanded training and education programs, such that there is going to be the next generation of scientists to pick up the strands, and more importantly that we have a population who understands the research being done and can make creative use of it. It is very important that we look at science training not just to produce the next generation of scientists but that we produce a broader based population who understand the implications of science and who can recognise at an early stage what particular developments of science need to be picked up.

When I talk about science I mean technology, engineering and mathematics of course. It is not just the narrow definition of science. Improvement in science education is important at all levels, because after all what value is our university education if the high schools are not producing the students who are going to go into universities and if the primary schools are not enthusing students to go into science at high school? One has to look at all three. I realise your brief is to look at higher education, but I plead with you to keep the importance of science education at the primary and secondary school level also at the forefront. Improving science education at all levels must be a first-order issue.

Contributing to basic science is fun but alone that is not enough if it is going to lead to a prosperous nation. I believe the creative application of this science to the needs of Australian and global societies is equally important, and there have to be mechanisms for the transfer of the basic knowledge from universities to products on the market shelf. When I talk about market shelf, it is a metaphorical thing. We should not ignore the fact that a lot of the benefits of science are actually in the public good. We do need an effective interface between the universities and the users of the research. This needs a lot of development. It is possibly the single most important failure of our present system. The importance of building up that interface has not been fully appreciated yet.

In our submission, which is before you, we have presented our views on some of the issues that need to be considered if we agree that Australia's future must be a technologically advanced country and one that contributes to the global knowledge base and that is able to make creative

and innovative use of this global knowledge. I would repeat what I said earlier on, but only because I believe that is the important thing: if that gets straightened out, I think we can meet our other goals. Some 11 key points were identified in our submission that we believe should be considered to ensure that there will be an active research program in the future, and we also consider in that what must be done to make research more interactive with the industry sector. Professor Kuchel will comment on those points in a moment. These issues that we have raised in the document have not come out of the blue. They were developed in last year's research and innovation in Australia policy statement, which I believe may be before you, but I am happy to leave a copy for you. It is a lengthier and more carefully developed statement on what we believe research and innovation in Australia should be.

One of the items that we identified was the need to develop new fellowships to ensure that there is a career path from the postdoctoral stage to mid-career stage. We are very appreciative that the government has picked up on this with the 'futures fellowship'. It is probably appropriate to remember that, with respect to the 200 fellowships, we have about 40 research institutions in the university system—putting aside the government institutions—and there are possibly 20 or 30 definable disciplines. When you divide 200 by 40 and then by 30, the number left is not very large and it does not create the critical mass that we really need to develop. While we commend this particular activity, I would also like to underline that it is a step in the right direction; it is not the end of that particular path.

The submission that we have put before you is no doubt incomplete, but we do believe that the fulfilment of the 11 points therein would go a long way towards a future in which the nation's socioeconomic and environmental prosperity will be underpinned by science, technology and innovation. This will result in a nation that is internationally competitive and one where new and exciting opportunities are continually being created and picked up to strengthen the quality of the life of all Australians.

CHAIR—Does anyone wish to add anything?

Prof. Kuchel—As I mentioned I am the secretary for science policy and coordinated this document before you. It was assembled by the secretariat in the academy and represents a broad view from the fellowship. We chose to focus on three of the dot points. The first was the overall value of Australian universities in this enterprise. The second was the quality and adequacy of the research training that essentially our PhD students receive. And the third was the factors that determine whether they stay on in the innovation and research system.

The first one is essentially easy to handle. It is the overall value of Australian universities in research training. Universities, by virtue of our system, produce around 99 per cent of PhDs. There are about 41,000 PhD students currently enrolled across our system and about 35,000 academics who are legally entitled to supervise those students. There are about 1.15 PhD students per academic, if you average across the whole system. That is a measure of the resource. I will come back to that point. That 1.15 is worth bearing in mind.

We have anecdotal evidence of the quality and adequacy of research training across our fellowship, but science and technology awareness in Australia is something that in every organisation throughout the world begins essentially at primary school. With an opening up or removal of prerequisites for entry into various university courses, there has been a liberalisation

of the requirement to take particular subjects at high school. The decline in the number of students taking science and mathematics is of concern to the Academy of Science, but that flows into the university with respect to the training students receive prior to entry to university. Those numbers are falling.

Returning to the issue of adequacy of academics per PhD student—the 41,000 PhD students to 35,000 academics across the country—I did not want to focus on my own personal knowledge, so I looked at a case from a Group of Eight university, the University of Sydney, where I am a professor of biochemistry. Our School of Molecular and Microbial Biosciences has a microbiology discipline—biochemistry molecular biology and human nutrition. There are 92 PhD students spread across 31 research active academics. That is three PhD students per research active academic. That is three times the national average. Of those there are eight academic staff who supervise five or more PhD students. In other words, more than half the PhD students are supervised by less than a quarter of the academic staff. That is the reality. A quarter of our academic staff are hitting well above their weight with respect to supervision. As soon as you say five times the national average for eight of the academic staff, you then ask what the quality of that delivery is. The Faculty of Science at the University of Sydney, like many others, would have a recommendation that the number of PhD students be restricted to five—that is a general regulation—so that the quality of the supervision is maintained. That is very discipline dependent as well, but in the sciences these days research groups will often contain a significant number of postdoctoral fellows who can assist in the overall process of supervision, so it does not just devolve down to one supervisor; it is a distributed responsibility.

What is lacking in the system—and this relates to what Professor Lambeck said—is the sense of empowerment by that student to manage their own affairs. Because the PhD scholarship is actually so miserable, below the poverty line, they do not have their own resources to go to conferences or to run their own pet projects, and they are really a very poor breed of individual. Something needs to be done. I think we have been caught napping in this country on that particular point. For example, over the next four years the federal government will double the number of APAs to 10,000. Ten thousand out of 40,000 means that a quarter of those students will be receiving Australian postgraduate awards—the premier awards.

If you look at our school with 92 PhD students—I did the numbers yesterday—a quarter of them, 23, receive APAs. A quarter of our students are getting APAs and yet the average across the country is 10 per cent. I would say our school is fairly representative of a Group of Eight university. You would have to say that the standard of those students is higher on average for whatever reason—historical probably. To increase the number of scholarships to 10,000 out of 40,000 would be to bring up to 25 per cent the number who would be receiving APAs. I think that is just acceptable. I could see an argument where that could be increased even further, but at least it is a step in the right direction. It is a doubling after all. You have the report before you, so I will not go through everything in detail, but I would like to highlight several other points. In the past 15 years the PhD stipend has increased by about \$6,000 from \$14,000. That is a 25 per cent increase. But in the meantime of course the average weekly earnings have doubled. I think you have the message. This is something that really should be addressed.

The next point we moved on to was to essentially, by example, illustrate to students that there is a career path in this research and innovation system. Unless something is done about academic salaries, something desperate will happen. I am sorry to talk about money. I have personal

anecdotes about why young women, in particular, do not stay in science when they have other responsibilities, such as a family. For example, in the 25 years since 1977 to 2002 the average weekly earnings and salary of a lecturer and associate lecturer have declined, such that there is a 25 per cent decrease relative to average weekly earnings in professors, associate professors and senior lecturers. The other point we addressed was women in science: approximately 50 per cent of our PhD students are women and yet 20 per cent to 25 per cent of career scientists are women. It is a complex issue, but in a sense it is a waste of intellectual power that they are not continuing on in this enterprise. I will leave it there and let you ask questions about it. They were the main points that I wanted to address.

CHAIR—As we work our way through this inquiry, it is becoming obvious that there is a problem at the primary and secondary school levels. Whatever we try to do to address the immediate problems at university may fall very short, because they will not be addressed at primary and secondary levels. Science has perhaps two areas—the teaching and appreciation of it, and the application of it. The teaching and appreciation level would be during primary and secondary schooling. There are always complaints about the quality of the teaching, and teachers who do not have science backgrounds are asked to teach classes. That applies to a lot of subjects and not just science in particular. Then you go to the idea of young people and career paths and money, and that is a challenge in itself. Is it appropriate to begin talking about PhD students going in to the teaching profession, probably at secondary and senior levels, to address the serious lack of quality science teaching at secondary school level? This would hopefully then give you future students and engender an interest in filling what is becoming a rapidly shrinking pool of availability of Australian students to pursue those professions in any serious way at university.

Prof. Lambeck—They are good questions. As a comparison, in Singapore's primary school system 60 per cent of teachers have university degrees, and their aim is to increase that and to have more teachers with masters degrees in the primary school system. There is a very big difference indeed. That is a problem. We are acutely aware of the teacher qualification issues and we believe that the teachers themselves are acutely aware of this problem. We started a program some years ago called Primary Connections that tries to address this issue, to improve science education through literacy in our primary school system. Correct me if I am wrong, but I think this has now been introduced into about 3,000 schools around the country. Excuse me if I get my numbers wrong. We can provide that information, but it is a very large percentage of schools and the uptake has been quite substantial. We have gone through our three-year trial program. It is being evaluated and we are now waiting to see whether funding will be forthcoming to go into the next phase, and we are hopeful that this will be the case. Certainly the Minister for Education is very aware of this program. I asked her to launch one of the units in a school in her electorate fairly recently and she did that with great pleasure. She is certainly aware of this program.

Prof. Kuchel—The idea is really quite simple. It says that if you are talking generally and studying literature, the topic should also be related to science. It is really weaving science in with general language and literacy skills. It is a very simple idea but a very good one. After all, we live in a technological society, so why not put it there?

CHAIR—It is very much common sense.

Prof. Lambeck—Another anecdotal case is that, recently, one of my brighter students that I have had for many years finished her PhD with me here and went and did a postdoc in Zurich. She announced rather shame faced that she was going to go to teachers college and learn how to teach. She feared that I was going to be upset by this. I said, ‘No, that is probably the best decision you have made.’ She is a gifted teacher. The result is that her and her husband, who also did a PhD at the John Curtin School, are both going into teaching. We certainly believe that we should encourage our PhD students, if they show that inclination, to go into teaching. We certainly should not steer them away from that.

Dr Meek—The interesting issue there is that there should not be an assumption that just because someone has science qualifications that they can easily move into teaching.

CHAIR—Not everyone is a good teacher, irrespective of their discipline.

Dr Meek—That is correct. One of the things that we have been very conscious of is actually providing materials that have been effectively worked up in collaboration with people who are experienced teachers to deliver essentially something that is foolproof in that regard. That is a really important component of this. We have had both scientists and educators working collaboratively to put this material together and that then provides an easier entrance point for people who have got the science; we can have exercises that will connect with the children and empower them to continue their learning.

Prof. Kuchel—It is also a mistake to say that because someone is a good researcher they are a bad teacher. That is an urban myth. In order to manage a team successfully you need to have good interpersonal skills. All of the people that I mentioned in our place who have big teams use their interpersonal skills as well.

FRAN BAILEY—Firstly, I congratulate you on your submission. I thought it was a very detailed submission. I would like to start with Professor Lambeck. I was fascinated when you told us that we contribute to three per cent of global knowledge. This is a double-barrelled question. Can you tell us which country contributes the most? What is the significant factor that enables them to be the major contributor to global knowledge? Is there also another factor in not only contributing to global knowledge but the important link that you made between research and industry? How does the country that contributes the most global knowledge fare on that index as well?

Prof Lambeck—It is fairly easy to answer the first question. The United States is by far the dominant contributor, probably followed by the UK. One has to be a little careful when you go beyond that ordering, because language, traditions et cetera come into it. The French normally do very highly, but if you write in French you are at an immediate disadvantage, so there is a question of pick-up. Certainly the US leads, the UK would be second and then you would see the major European developed countries of France, Germany and Italy, which does surprisingly well. The secret for success is investment and diversity of investment in the US, where there is not a single system but a complex multiple system—federal, state and private systems. That combination seems to work well. That of course comes down to science. It is a big pool, so you can experiment more and have much more freedom in developing alternative models. Investment is an important part, and I am particularly thinking in terms of private investment in the system, both through the donation system but also the industry involvement. This raises an

interesting point. In the US there is much greater freedom in movement between industry and universities. People can move from industry into university for a time. They can move back out again. They can set up a company, get it so far, and move back in again. That is a very standard part of an academic life there, and that is something that is very difficult here. There is a tendency here that once you move out you are out. Those are some of the issues that make a success story. In the case of the UK, there was recognition earlier on than here about the importance of developing links with industry and getting the industries involved in universities.

Mr CHEESEMAN—At the last meeting we had a discussion with some people from a university about some of the barriers that might exist between those studying for their PhD and their being able to work at the same time perhaps on a part-time basis within industry and applying their learning. Do such opportunities exist to have PhD students working in schools on a part-time basis teaching in their related discipline, providing an additional stream of income, particularly given the shortage of schoolteachers who have the right qualifications to teach science. I am not talking about full time. I am talking about perhaps half a dozen hours a week, providing an income to get them above the \$20,000 that they receive as a stipend. I am wondering what sorts of boundaries, borders, challenges and difficulties there might be around that.

Prof. Kuchel—The Australian Postgraduate Awards are for three years, and we have already heard how relatively miserable that is. I have supervised 20 PhD students myself to completion. Six of them are now full professors, five in Australia and one in New Zealand, and most of them have stayed in research in one way or another. So that is a fairly good record. But only one of them finished in three years. That is the reality. These are highly intelligent, competitive people. They cannot do it. If you spread out the PhD candidature what you miss out on is the intensity of effort that comes from a young person available to devote their attention full time to their particular problem. If you do not pay them enough, they have to work in a restaurant or something like that and then spread out their PhD over four years. They are worrying about scheduling their time to this particular commitment, such as working or teaching and so forth. It seems to me it is a two-edged sword. It is a trade-off between having enough money to live and maintaining that intensity of effort, which they will never, ever get again in their life. This launches them off into their research career. It is a difficult one and, quite frankly, I would find that too difficult to manage.

Prof. Lambeck—There are two sides to that question. One is the benefit of the PhD students, but the other one is the benefit of the school students being exposed to having younger university students teaching, and not so much teaching the formal work but assisting and widening the school students' exposure to what goes on in the world. I think there is a real plus in that. The CSIRO has launched a program called Scientists in Schools where they try to put leading-edge scientists into schools for short periods during the week to talk to students and try to include them in this.

At the academy we have talked about that possibility for students for exactly the reasons that you have indicated—to supplement their income. The problem that you run into is the one that Professor Kuchel mentioned. If you make the program too intensive for them, it drags out the whole research program, and I do not think that is desirable. The concept of bringing them in for short periods to talk about their particular area of expertise has great merit for the PhD students. Hopefully some of them may want to become teachers. It also supplements income more

constructively than being waitresses and waiters in restaurants. At the same time it may well be very beneficial in complementing what is going on in the schools.

Dr JENSEN—I would like to get back to the issue of primary and secondary education, which is the critical thing. An issue of considerable concern to me is looking at the reduction in interest in science and mathematics from students. It is reflected both in terms of numbers and in terms of cut-off scores. I had a parliamentary intern last year. I do not have a copy of his full report yet, but he found one very profound thing in his literature survey with regard to science education. In the education literature it was all about teaching kids about science and not about teaching kids science. How do we get beyond that so that we are actually teaching kids science? Kids are natural scientists. When you think of a kid in a high chair, 'If I knock this over it falls on the ground. If I knock it over again, will the same thing happen?' Somewhere along the line we are losing these natural scientists to other fields. I would like to know how we can keep that going.

CHAIR—I am a language teacher so be very careful how you answer that.

Prof. Lambeck—I do not know whether any of you watched the interview with David Attenborough on television on Monday evening. There was a very telling episode there. He was asked why he got interested in science, and it was essentially through very careful mentoring by teachers not telling him the facts of science but getting the child to question things and to ask questions. That is very much the core of our Primary Connections program. You start off by getting the children to ask questions. For example, why is the sky blue? That is perhaps too difficult. Why does the apple fall down? You get them to ask the basic questions and you do not necessarily give them the answers. You get them to discuss it amongst themselves. They will come up with some answers. You would then say, if that is right, can you think of some way of testing it? Then they test it and find that it does not work and say, 'Oh, that's interesting.' They go around, in a sense, in circles. It sounds a fairly pointless exercise in many ways, but at the end of the day they have developed this inquiry based approach. They ask the questions, they discuss it amongst themselves, they design tests, they go back and check it out and then they extrapolate. That is the approach that has to be developed for teaching science and I think all disciplines.

The important thing is that we do not take this away from the rest of the teaching program. It is teaching science through literacy, and this is a very important result. Teachers are coming back to us and saying, 'This is great. I could never get Johnny to write anything. He would never write about what he did last weekend, but he is quite happy to write a little report on the experiment he has conducted.' The literacy teachers are quite enthusiastic about this program as well.

The challenge is how we carry this over. This is my greatest concern about our current program. We are nearing the years 5 and 6 stage in primary school. Kids are genuinely enthusiastic about science at that point. What will happen to them when they go into high schools? That is why I would be very anxious to expand upon the pilot program we have, Science by Doing. That is in a very early stage and has been tried in only a few schools.

Dr Meek—That is a different system, which is probably more oriented towards essentially starting the nascent research skill development that is required in the sense of it being material that is provided in a way that encourages students to go out and find more corroborating

information. It is essentially building on the inquiry based issues that Professor Lambeck has been talking about, but it is starting to fill in with more detail and more technical information, and actually starting to develop their skills in that regard. As you would know as a result of your inquiries, the quality of the students that come into first-year university often requires effectively almost a bridging program, because the students have not acquired the skills that they really would ideally have had in order to move effectively straight into a research or an undergraduate degree. That is a bridge, as has been mentioned. It is at the pilot stage. We have had some fairly enthusiastic responses and an independent review, which is showing us that we are going in the right direction, but it will need additional work.

The other element that I would like to bring in, which touches on a couple of comments that have been made, and also in terms of your question about bringing PhD students into schools, is that there is this dilemma between providing this information and providing this teaching pattern, and still getting curriculum outcomes to actually get some sort of degree of consistency about the level of information that students have to go forward with. Things like bringing students in and making them responsible for curriculum delivery would be quite hard. Hence the suggestions being made in terms of science in schools. Similarly in any program that is developed with the Primary Connections program we have been acutely aware that not only do we need to have them enthusiastic and wanting to go out and explore; they also need to have a certain level of base knowledge they can build on. That is one of the reasons we have tied the primary curriculums material very closely into the curriculum deliveries required across the country. We have had every education department in the country involved in this as well as the National Science Teachers Association in order by default effectively to deliver a national curriculum consistently.

CHAIR—I would like to give everyone a chance to ask questions, but I am mindful of the time.

Ms RISHWORTH—I am going to go into a different area. You mentioned the huge drop in female PhD students from 50 per cent to 20 per cent. I did notice that you explored a couple of issues in your submission. However, you said that there are insufficient flexible employment arrangements when returning. Do you have any ideas or solutions that research institutions need to address? I do not mean rules, particularly, but is it a cultural thing? What things can you see to make those conditions more favourable?

Prof. Kuchel—I think it is a cultural thing. At an institutional level there is no sense of any discrimination. They see this as a resource that is being lost. We need simple things such as better childcare facilities, for example. Perhaps there should be legislation that says for every 100 staff there would be some sort of childcare capability. We looked for examples of this in Sweden and the Scandinavian countries where they seem to do these sorts of things better. Things are improving dramatically in this country, but that is one issue. There is an issue around returning to the workforce, but it relates to women and young families as well as to industry.

Ms RISHWORTH—What about employment structure in terms of job sharing and collaborative research groups? Do you see a possibility for that to be extended?

Prof. Kuchel—Yes. That is possible. Again, there is a trade-off between maintaining momentum in a research program and dividing it amongst individuals. Big breakthroughs take

place in one brain usually, although it relies on a collective focus. It is very tough on those people who are working part time.

FRAN BAILEY—Is it a reality that people would want to share the kudos from the research?

Prof. Kuchel—That is the ego side of discovery making, yes, but that seems to be managed pretty well.

Mr CHEESEMAN—I am sorry to interrupt. You need to get the employment structures right, and address those employment issues that create barriers for women to return. The brainwave, that moment of inspiration, could come in the shower or it could come when driving to the supermarket. It does not necessarily happen in the laboratory, does it?

Prof. Kuchel—That is an excellent point.

Mr CHEESEMAN—I would not see that as a barrier.

Prof Lambeck—It happens in the shower or wherever you are, but you need the flexibility to be able to respond to that, because, if you do not have the opportunity to go to the lab for another week, by that time you have either talked yourself out of the idea or you have forgotten it. Flexibility is the key thing.

Mr SYMON—I would like to delve a bit further into the relative decline of academic salaries. I find it quite disturbing, looking at those figures, that over a sustained number of years there has obviously been a continuing drop. It would seem to me that that would make it even harder to keep people involved in research and not have them poached by private industry, where there is always a great demand for people with those types of qualifications. I am interested in what you think the reasons are for that drop. I look at it and I might say it is lack of industrial muscle, for instance, but is it something more than that? Is it just because people are prepared to do the job and stay there because of the love of the job and allow that to continue on, and it has just gone that way, or is there something that I have not seen that is apparent to you from that sector?

Prof. Kuchel—We both have a view on this. It is a very interesting point. I suppose we have all got one life and one lot of time to handle things, and a lot of what is done in research is driven by a passion. We have to distrust passion. I think it was Prince Faisal, speaking of Lawrence of Arabia, who said that, for Lawrence, mercy was a passion but, for him, mercy was simply good manners. I would leave it to you to judge which is the more reliable. We do base it on this drive to discover something. It has been let slip and something needs to be done, because we need to recruit the next generation. It is true that the baby boomer generation of scientists are still very productive. A recent survey in the US showed that the productivity of papers by the 50- to 60-year-old age group is as high as it has ever been for the other groups, so they are still very research active and many are working through into their seventies. It is something other than money that drives this. We also have to plan for the future, and this next generation is not going to tolerate those low salaries.

Dr Meek—It cannot be assumed that gen X, gen Y will—

CHAIR—Yes, we are dealing with a very strange generation, aren't we?

Dr Meek—We are looking at a different group of people that really want more work-life balance in terms of what they do. Also, as we have touched on already, there are very attractive opportunities elsewhere.

CHAIR—They have also got shorter attention spans, want to do things very quickly and succeed very quickly, and money becomes an issue. There is no doubt that money is an issue.

Prof. Kuchel—I hope that helped.

Prof Lambeck—It is an important issue. For example, my children decided at some point that they were not going to be scientists. I am not concerned; they have done well in other areas. But when I probed that a little bit one of the things they said was, ‘Your students come here. Your postdocs come home and we see them struggling, and we really don’t want to go down that path ourselves.’ There has been a loss in salary. **Mr RAMSEY**—Your summary mentions that movement of researchers between academia and industry would be facilitated if more recognition were given to the work in industry when trying to get into academia. How often would you get someone out of industry and into academia under current circumstances? I would think it would be quite rare. How do you see your work in another area being officially recognised and ticked off to give you the kudos to go back and be a chair of a research section or whatever?

Prof. Kuchel—It happens variously in different disciplines. In engineering I understand that it is more likely to occur. In the biomedical sciences you have a situation where the clinician scientist is actually seeing patients effectively working in their equivalent of the industry and coming back to the lab. That is a very successful interaction where the inspiration for much of their research comes from dealing with patients.

Mr RAMSEY—Is it well recognised in that field?

Prof. Kuchel—That is a well recognised modus operandi. In other areas such as molecular biology the industry equivalent, say, is genetic modification of plants. That is out with the farmers and so forth and is a slightly different interaction. But in industry we tend to think of making things, and that tends to be engineering. There is interaction via our Cooperative Research Centre program, and others would be better placed to give you the numbers on that. But there is no question that, because we do not have the industry making base in this country—unlike in America—we do not have that opportunity to exchange. America also has the huge military industrial complex that provides a lot of funding for even basic research, and in those organisations they have a fairly liberal view on what is allowed for research. Some very basic fundamental research is done in those companies, which tends not to happen here. That is generally talking around the point, but I hope that helps.

Prof Lambeck—It is probably discipline dependent. I come from a geoscience background and what has tended to happen there is that most of the Australian companies that had research capabilities have closed them down in the past decade or so—BHP research labs went, Western Mining’s has been cut back and CRA has cut back. When things are not going too well, the first thing that tends to happen is that the research laboratories here get withdrawn. In the case of Shell, for example, they go back to the parent company. It is very difficult to develop the interface now, because there is not necessarily a research-minded community in the industry.

Mr RAMSEY—We do not really have a structural problem; there is a lack of industry people suitable for research. Is there nothing structurally we can do to fix that?

Prof. Lambeck—The CRC program goes a long way to trying to bridge that interface between the industry and university sectors. That is something that definitely needs to be looked at and further developed. That is not to say that all CRCs must have industry participation. There are also so-called public good CRCs, of course. My concept of industry is perhaps broader. It includes the public good areas. It is not necessarily the manufacturing industry. There is a structural one, but there is also probably a need for industries to be encouraged to get involved in the research themselves and in the research funding. Interestingly, I went through the University of New South Wales in the late fifties and early sixties, when the university was just being set up and when there was obviously a great shortage of lecturers. Most of my lecturers actually came from industry. They were part-time lecturers who came in, unfortunately usually in the evening, so it meant you had your lectures late at night, but it gave one a totally different perspective on what one was learning from the full-time university lecturers, and I have always liked that idea. That is something else that may be worth exploring: whether one can get a greater involvement from part-time teachers.

CHAIR—Thank you. This has been very interesting. Finally, when you talked about the Future Fellowships scheme you said you felt that its current format would be insufficient to provide a critical mass in order to create a long-term comprehensive base. I am intrigued. What are the figures that make a critical mass something that is acceptable?

Prof. Lambeck—I do not think I can answer that, because it is very discipline dependent. I can think of some of my own examples of success stories. Where bright ideas have been developed, have been picked up and turned into a product that has been beneficial to the community, you are looking at a minimum of, say, three or four top scientists who develop the early ideas. At some point they hand it over to others who can ensure that the developmental work gets done and so that they themselves can stay active in creating the next lot of ideas. What you tend to see now is that you have your bright ideas and you are faced with a choice: ‘Do I drop it and go to the next one or do I develop it?’ That critical mass has to have that balance. It is not just about the creative researchers; support is also needed.

CHAIR—Thank you very much.

Prof. Lambeck—I believe this is one of the most important parliamentary inquiries being undertaken. We at the academy appreciate very much the time that you are putting into this and will put into this. Certainly if we can provide you with further information we will be happy to assist.

CHAIR—Thank you. I agree. Everyone here senses that this is a very important inquiry, and the challenges are absolutely huge. We look forward to getting back to you if we need to and certainly sharing our findings with you as well and getting your advice on them. Thank you very much.

Proceedings suspended from 11.01 am to 11.17 am

BELL, Professor Sharon, Board Member, Council for the Humanities, Arts and Social Sciences, University of Canberra

GASCOIGNE, Mr Thomas Humphrey (Toss), Executive Director, Council for the Humanities, Arts and Social Sciences, University of Canberra

HUGO, Professor Graeme John, Council for the Humanities, Arts and Social Sciences, University of Canberra

CHAIR—Can I take this opportunity to welcome you here. There is an official statement that I need to make for the purposes of Hansard. Although the committee does not require you to give evidence under oath, I should advise you that these hearings are formal proceedings of the parliament. Consequently, they warrant the same respect as proceedings of the House itself. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. We thank you for your submission and now welcome you and invite you to make a brief opening statement before we proceed to questions.

Mr Gascoigne—We want to make a number of short points. I think the first one is that we would agree with many of the issues that were raised by the group that preceded us here from the Academy of Sciences. I think that most of the issues that confront the world of research in universities are in fact shared by both sides, although there are some important differentials. Some myths—perhaps it is too strong to say that—might have crept into the thinking of not just governments in Australia but also governments overseas. There is one that we would particularly like to address right from the outset and that is that the shortages in trained and skilled people lie solely within science, technology and engineering. There are some acute shortages in areas of the humanities, arts and social sciences and there are some unemployed or unemployable engineers and scientists driving taxis in Sydney. Commonly when people stand up and say, ‘We are suffering from a shortage of scientists and mathematicians,’ in some areas, yes, that is certainly true, but we are suffering from just as acute a shortage in areas of the social sciences. Demography, which Professor Hugo represents, statistics, language teaching, history and philosophy of science are a number of the areas in which there are shortages.

The second point I would like to make is that the demand for highly skilled and highly trained people in Australia is somewhat uncertain and one of the things that we would suggest to this committee is that you might consider, in fact, doing an audit. The demand could come from three areas which we have identified. The first one is government, because these days in government people have to work smarter, faster and harder and life is more complicated, and you would be acutely aware of that. So, the demand for highly trained people working in the echelons of government is quite strong, we believe. And I guess you would be coming more and more in touch with people with PhD qualifications there. How much higher is the demand going to go? There is a growing demand from people in industry. There is a demand which has not perhaps been properly quantified and that is from the university sector. Somewhere between one-fifth and one-third of our research and academic staff is due to retire in the next 10 years. University researchers and educators have the highest average age of any workforce in Australia except for farmers. We believe it would be appropriate to have a national audit to find out what the future demands are.

The third point I want to make is that we believe Australia really needs to take a more strategic approach to the way it looks at this whole issue of workforce, of training needs, and where we stand in the world. Market driven solutions have quite a part to play in some of the short-term adjustments which the university sector can make but there are also long-term strategic issues. And one of the things that have fallen by the wayside over the last couple of decades has been the fact that the career path for younger researchers simply does not exist. It is very hard for the best and brightest in our community; the very people we should be nurturing most, find it difficult to establish themselves on a solid career path. I think the rest of the submission stands for itself. Professor Hugo is the expert in demography and has done deep studies, and his paper is attached. And Professor Bell's expertise lies in a number of areas. She has been a senior academic researcher with the University of Canberra and is currently working with the University of Newcastle and the University of Melbourne. She has also done special work in equity and gender issues. I was really interested to note, when skimming through your maiden speeches—that intensive research we all do—the number of times the issues of inequity and education came up in the comments that you made when you first stood before the House.

CHAIR—Thank you. You have stunned us with that.

FRAN BAILEY—I am desperately going through my mind, trying to remember what we said.

CHAIR—We did say things about public education; I do remember that very well.

Prof. Bell—I have a couple of points in relation to those issues of equity and gender in particular. Something I did pick up from the previous conversation is that I think we have to be very careful, when we look at the issue of the PhD, not to assume that the PhD is now just an entry level qualification. Our PhD population now, particularly in the humanities and social sciences, is a very complex population. Many people take on a PhD now not at the beginning of their career but mid-career. In Canberra, in particular, we have a number of very senior public servants who actually do a PhD at the conclusion of their career as a vehicle for reflecting on a lifetime of professional practice and public service. There is a complex population. There is a good evidence base. One of our colleagues at Deakin University, Terry Evans, has done a survey of PhD students and this comes out.

In that context I think there are two really important points in relation to equity. Firstly, the honours degree in the university system is still the normal first step to a PhD and a large number of our low SES students actually decide not to take on the honours year, having lived in poverty for three or four years doing an undergraduate degree. There are very low levels of support for honours students across the board and it just becomes a really important decision-making point: why would I do this? The second factor is I think in relation to gender. What we see is that over 50 per cent of our undergraduates are women. More than half our honours students are women. Now about 47 or 48 per cent of our PhD completions are women, but after the PhD we see a very distinct dropping off of those women. They do not actually continue and enter into the academic workforce in particular and we do not know a lot about those decision-making processes nor indeed the incentives or disincentives for those women to remain in the productive academic workforce, although we can all speculate about issues such as child care, work-friendly workplaces et cetera. They are the issues that I think are really critical.

Prof. Hugo—Just in terms of the demography, I think it is very important to point out that the academic workforce is one which has been influenced more by the baby boom than most other areas of the workforce. That is one of the reasons why it is one of the oldest workforces, because so much recruitment occurred in the 1960s and 1970s and early 1980s and then there was a real period of quiescence so that there is almost a missing generation within the workforce structure. Generation X is very, very underrepresented within the academic workforce. Australia is not the only country experiencing this. Canada is experiencing a real shortage of academics, as are many of the European countries, although the UK now has only 17 per cent of its academic workforce aged over 55, compared to our 26 per cent. And that is partly due to some of the things which it did in order to cope with the ageing of its workforce.

It does seem to me that we have got a period of opportunity to meet the demands. The real crunch will not come for another 10 years or so, when the major groups are leaving. I think we do have to put in place the policies which are needed to make up not just current deficits but this loss, as Mr Gascoigne said, of between one-fifth and one-third of our workforce. It has been done in a totally different environment to when we last used migration to build up our academic workforce, which was in the 1960s and 1970s. There is much more international competition. There are more Australians going overseas, competing for work in those international labour markets, and there is much more demand for PhDs in the private sector and in government than there ever was in the past, so recruiting in the future is going to be much more difficult than it has been in the past. I believe we do not know enough of the fine-grained detail of where the shortages actually are. They do not occur across all disciplines. It is true to some extent that they are there in every institution in Australia, but I think we really do need a fine-grained analysis to say where the future demand is going to be, the future need is going to be, and what sorts of supply factors are available. But it is that sort of fine-grained analysis which I think we need to guide policy in this area.

CHAIR—PhDs in research in science seem to be easier for people to understand as to what they do, their relevance and how they are applied. PhDs in the humanities are a little bit more complicated and difficult for traditional areas of employment to understand and to grasp and therefore people might have a PhD and finish university and say, ‘Okay, where can I get a job,’ if it is a PhD in literature or a PhD in something obscure. I hope I did not misunderstand, but you talked about integrated research. I understood it as something that relaunches the value of a PhD in the humanities and its relevance and indeed application to skill shortage and to areas of industry and other areas that one would not traditionally associate it with. How do you go about doing that, because that will determine who takes them up and sees a future in pursuing a PhD in the humanities.

Mr Gascoigne—There is a fairly narrow range of things that researchers get rewarded for within the university sector. They get rewarded for winning research grants. There was an article about that in the *Australian* today, you might have noticed. They get rewarded for publishing papers in international journals and they get rewarded for having students. Funnily enough, they do not get rewarded for doing things that are particularly useful, like solving problems. Let us say the department of immigration wanted to commission a study or a report on such and such, which would materially change the policy of the country. The reward benefits you would get out of doing a bit of research like that are pretty limited. So, in that paper, which is really a discussion document that we lodged as part of our submission, we are suggesting that we need to have a fresh look at the way the government might take a more active role in commissioning bits

of research where it needs advice. I think everyone now is committed to the notion that policy should be driven by evidence rather than superstition or myth or what you generally believe, so you really have to have that evidence to drive that policy. We have suggested that you actually need to think outside the current square a bit and create a new career path where people can get rewarded for doing this sort of work. It is the sort of work that Ann Harding does. Are you familiar with the modelling that she does around social issues and taxation issues and so on? It is that sort of work which does not seem to get rewarded very much.

Prof. Bell—While there are obviously significant disciplinary differences between social sciences, humanities and arts, it is fair to say that, historically in those disciplines, the research higher degree focus has been driven by individual interest, and students often still choose their doctoral subject and then actually seek to find a supervisor who may be able to supervise that. Sometimes a supervisor will encourage research in certain areas but there is still a great deal of individual freedom. The sort of integrated research which is problem based sees the capacity to develop much stronger teams of researchers working around problem based issues and also brings teams together that may be across disciplines so you could have a number of different disciplines working in a team. Of course, one of the advantages of that is that each of those participants does not just contribute to a major issue or problem but also develops a very wide range of skills through that process, including the important skills to be able to communicate and work with colleagues from different disciplines. It is something that we see increasingly through projects funded by areas such as the ARC linkage grants but it is still a small proportion of activity in the humanities and social science sphere.

Mr Gascoigne—We live in a world of silos, and we wrote an earlier report which came out about a year and a half ago saying that it is pretty difficult within our system to do collaborative research. If you are going to deal with issues like water issues in the Murray-Darling basin, you need people who are experts in salinity, who know about pipes and engineering and who understand natural processes, but there is also a huge role for economists to set the market prices. You have to change human behaviour and cultural approaches to water. For instance, it has been remarkable the way people's gardens in Canberra have changed over the last five to eight years from lush, green, European style gardens to bush gardens. The point I am making is that a collaborative approach is required, where you need the expertise of a number of disciplines, yet it is hard in our universities for an engineer to work with a musician, a historian or with a social scientist. It is hard within our funding structures because your funding proposal will be referred to the physics and chemistry panel or the arts and humanities panel or this panel and, if there is no expertise outside that panel area, how are they going to judge the worth of a proposal? If you are a physicist, you are not going to feel very comfortable dealing with something which brings in a completely foreign discipline.

Prof. Hugo—To just underline what Mr Gascoigne has said, I do not think there is a single problem which Australia or the world faces at the moment that does not have a social or people component. There is no way that technology alone is going to solve any of the problems which we have. I think the case with water is one where, really, we have the technical solutions, but it is a matter of actually changing behaviour, which is absolutely critical. I would see humanities and social sciences as not just being peripheral but being central to the solution of the major issues, whether it be global hunger, environmental issues or peace. All of these issues are ones which have a very, very important social science component. I see the research that our PhDs are doing as not being at the margins. Certainly there will be some topics which might appear to be a

little bit away from the main, central area, but you do have to do research on the margins if you are going to make the real breakthroughs that achieve change.

CHAIR—I guess you could say that technology and advances in technology may actually impact on human behaviour in a way that will require social scientists to deal with the management and the ramifications of that behaviour.

FRAN BAILEY—I will just follow up and refer you to a comment that you made. You talked about a strategic approach in meeting sector needs. So that I am not putting words into your mouth, is what you are referring to identifying, for example, what Professor Hugo was referring to as those employment shortages in specific areas that we were talking about informally before we began the formal part of the hearing? Rather than just talking about a strategic approach, can you give us some examples? Let us get down to some of the nitty-gritty ideas of exactly what we could do?

Mr Gascoigne—I think there are issues relating to career structures within the university sector. Thirteen years ago I was involved—I have this dubious history with which Mr Jensen is quite familiar—with the Federation of Australian Scientific and Technological Societies. So I had nine years experience in science policy areas before moving over to this sector. We ran an event at the National Press Club which was about career structures in the universities. We had young people, people of about 32, there. I remember a physicist who was 35 or 36 stood up and said, ‘Since I have graduated with my PhD 10 years ago I have had 12 different jobs.’ He said, ‘My life is like being in a holding pattern above Sydney airport and I am waiting for a lecturer B-level to die off or retire so that the job becomes vacant and I can land.’ I think that in some ways there is a scandalous waste of the people that we really are going to rely on to lead not just our tertiary institutions but to train the future leaders in the future. As well as looking at the PhD issue, I think there is also an issue of what happens to PhDs when they graduate. From the humanities, arts and social sciences about 45 per cent of those people end up in private industry or in government and the others will go into research institutions—

FRAN BAILEY—Is part of the strategic approach identifying the areas within our society where there are acute needs, not just now but in the future, and then making sure that we have got, for example, the PhD students with the appropriate training in areas of research who are going to be able to deal with some of these issues? And, picking up Professor Bell’s points, if many of these are female PhD students what do we have to do to make sure that we are going to keep these bright women in the system to assist us for the greater good of the country?

Mr Gascoigne—I will say yes and then I will hand over to Professor Bell.

Prof. Bell—I think part of the dynamic here that is really important is that our universities in recent times have had to, through market necessity, respond not strategically but to market demand. That has been the basis of their funding. Student demand has driven income, for both domestic students and international students, so what we see is a series of decisions being made about what are the growth areas in universities, not necessarily based on what is strategically most important for the institution but for the country. How we actually balance short-term versus long-term interest has been completely overridden by the actual necessities of continuing to be operationally viable in the short term and responding to market demand. Some of the areas that we mentioned earlier, such as demographics, economics and languages, are very good examples.

They are all areas where we have seen a decline in student demand and therefore we have seen a decline in the university staffing profile. We have seen high levels of casualisation and therefore it is a vicious cycle. They have become unattractive areas for students to undertake research higher degrees in because there are not the career options that attach to those disciplines. We really need to be thinking strategically about what are the areas that are absolutely crucial for our future needs and how do we best support them? Whilst obviously a lot of what we will do will remain market driven, we need to have mechanisms to look at how we support universities strategically as well.

Prof. Hugo—And it is not just that the numbers of staff in these areas has fallen off but they have aged as well. If we look at the oldest subareas within the universities, they are very often these sorts of areas. Mathematics—statistics, for example—has one of the oldest groups within the oldest professions—

Mr Gascoigne—The second oldest.

Prof. Hugo—That is right. But agriculture is another one which is an absolutely key area but has got a very aged structure. Identifying strategic areas which are really crucial to the nation is I think very important, and not allowing it to be driven by the magic of the market, which often biases it towards things which are in demand among foreign students particularly. The other thing to bear in mind is that the opportunities elsewhere, not just outside of universities within Australia but overseas as well, is increasingly a factor here. If the opportunities are not being provided for high-quality, young PhD graduates they are going to go elsewhere. They will increasingly move elsewhere and that is already starting to be shown.

Ms RISHWORTH—In relation to some of the comments you made about the honours year, I guess we have seen a trend for a lot of universities to do a course work in masters where you do not have to do the honours year anymore. I am very interested in that because it is a good introduction into research, and people who may not have been interested in research before do the course and become quite interested. It is treated like an undergraduate course. You have to pay for it. You have got to balance your work and all the rest. You have to pay HECS. Did you have any specific ideas about how to make that year more attractive to attract those students, especially from lower socioeconomic groups, into that honours year?

Prof. Bell—I do think the financial support is absolutely crucial, partly because the honours year becomes the first point in your university career—to pick up on the point of our colleagues from the academy—where you actually have the opportunity if circumstances allow to undertake an intensive period of focused research or work, and that intense experience is really critical to grabbing people's imagination and passion that would be the foundation for them moving on. Often, as you know from the statistics, our students are working anything between 13 and 20 hours a week on average. If you are juggling that with an honours year and perhaps carer responsibilities, the honours year is not going to be a foundation for you to say, 'This is my life; this is how I want to live the rest of my life.' There is the opportunity to support students appropriately through scholarships and perhaps work-integrated learning programs, which give them the opportunity to gain professional experience, perhaps on a paid basis. There is a whole range of activities where that support could extend the intensification of the process rather than take students away from it. Interestingly, and I had not thought of it until I was listening this morning—and I think this is indicative—when I finished my undergraduate degree I became a

tutor in a sandstone university. There is no way that someone doing their honours degree now would actually gain tutoring opportunities within a university because the whole structure has changed. What did that opportunity to tutor give me? It gave me the opportunity to focus on my research and really experience that intense experience of really being an embryonic academic.

Prof. Hugo—I went through the tutorship model and I think it was a perfect bridging, mentoring opportunity to become an academic. I do a lot of work with the OECD in the demography of different workforce groups, and certainly in the university areas now they talk in terms of talent identification. That is really the role that is mentioned all the time. In my time in Australian universities I have seen that the honours degree used to be our talent identification means. You had to be the very best of the best to be offered honours. Now honours is an option if you do not get a job. It has become a second best or a third best option. It is not identifying the best possible people, and so I think we do have to look at it and say: how do we make this work to make it attractive to the best of the best to go on to a higher level? That may mean we notionally bring down what is undergraduate and what is postgraduate so that the honours year becomes basically the first year of postgraduate so that you become eligible for funding, for example, but still make the criteria of entry into it high. I think it is really falling down in terms of identifying our best possible people. We have to look elsewhere to recruit high-quality students and often that is overseas.

CHAIR—Where are the best possible people going?

Prof. Hugo—I think a lot of them get a job in the government or in the private sector.

CHAIR—They are leaving honours positions vacant for those perhaps who would not ordinarily be eligible if they had to compete with the best possible people? How much of that is an issue and what is the impact of that? I think I know the answer to that—I just do not know how much of a problem it is.

Prof. Hugo—It is very significant. I am talking from my own personal experience, but I doubt whether that is a unique experience. It has been a cultural shift away from honours being the natural progression if you are in the top couple of per cent of students. That was the natural progression. It is not necessarily the case any more.

Mr Gascoigne—What was that statistic you said this morning about the birthplace of PhD students?

Prof. Hugo—I was just looking the other day at the qualifications of the Australian population and half of our PhDs in Australia are born overseas compared to 23 per cent of the total population being born overseas.

CHAIR—They are Australian, though? Overseas born as in they come from overseas to study specifically—

Prof. Hugo—No, they would be across the board. They would be people who have been recruited from overseas with a PhD, people who have come here and done a PhD and stayed—

CHAIR—But what I am trying to work out is that they have not been educated here.

Prof. Hugo—Some of them would have been but I guess the point I am making is that if they were representative of the group in the population, they would make up 23 per cent of the PhDs.

Dr JENSEN—I would be one of those.

CHAIR—You would be one of those. I was born overseas too but I came here when I was four so I do not think I qualify to be an overseas graduate if I did what I did but—

Prof. Hugo—That is exactly the sort of work that needs to be done, the fine-grained work to tease that group out. We need to separate out the people who have grown up here as Australians as opposed to those who are being recruited in from the outside with—

CHAIR—Because there is an emerging suggestion that in order to fill gaps we need to allow for overseas students to be beneficiaries of Australian paid scholarships. That is going to cause tension obviously in relation to whether Australian taxpayers' money should not be encouraging our own people as opposed to funding overseas students. But that is another matter.

Dr JENSEN—There are some interesting things getting teased out here. One of the things that was mentioned here but was also mentioned by the Australian Academy of Science is the issue of the relative drop-off of females versus males post-PhD. One concern I have sometimes is that you can read different things into statistics by not comparing like with like. There was a statistic presented by the last group that only 20 per cent of PhDs in academia were female as opposed to about 45 per cent, I think they said, who completed PhDs. I do not know whether you have this data, Professor Hugo, being a demographer, but I guess you would be the person to ask. What I am interested in is, after a certain period of years, what percentage of male and female students who completed a PhD are still in the field—rather than the overall view, where it could be misrepresented? The other concern I have is in terms of the specific fields, both in the humanities and in the hard sciences. What sort of percentages do you actually have there? It is a similar question to the broad question I asked, but I suspect that with the humanities, arts and social sciences, the percentage remaining with females after a certain number of years would probably be higher than the hard sciences. The problem with hard sciences, I would suggest—I am not a social scientist, so tell me if I am wrong and tell me whether it is just a hard sciences bias of mine—is that to go and have a child and then try to return to the field is pretty tough—you lose currency. I think that is the daunting issue with the hard sciences. Whereas with social sciences my guess would be that it is relatively easier to re-enter the field after having a child because currency is not quite as critical.

Prof. Hugo—Professor Bell has done quite a bit of work in this area, but I will just make a couple of comments. I guess I would not take the point that you could slip in and out of social sciences fairly readily these days. If you are out of it for a couple of years I think you would find a lot of trouble catching up, so it is probably an issue right across the board. We have done quite a lot of work from individual universities looking at attrition rates, the extent to which people in particular age and gender groups and so on are staying within the system. There are two groups among whom attrition is very high. One is, naturally, when people get to retirement age. But it is women in their late 20s and 30s that are the group that are leaving universities. There are a number of factors here and obviously the lack of family friendliness in universities is one of those issues. It is very difficult to combine having a family and then—

CHAIR—This is not a very family friendly place, either.

Prof. Hugo—I would argue very strongly that if one workplace in Australia could be family friendly, it would be universities, where the demands on time are relatively flexible and so on. I was telling Professor Bell a story earlier about Professor Faye Gale, who unfortunately died a couple of weeks ago. She was a previous Vice-Chancellor of the University of Western Australia. In the 1950s she became pregnant with her first child and she went to the Professor of Geography at Adelaide and said she guessed she would have to resign. And he said, ‘No, we will work around you,’ and so on, so she stayed in the profession and got to the absolute top. But that is really the exception rather than the rule.

CHAIR—My husband is at university and because of the flexibility of being at university he can actually look after our kids when I am away. So you are right, it is the most obvious place, but on the other hand I am surprised it is not accommodating to women generally. I always talk about that in our private situation.

Prof. Hugo—The potential is there but you have got to have the structures and the culture in order to enforce it. There are other things—the glass ceiling and a number of factors—which are involved there. It does seem to me that this is so important from an equity basis but it also makes absolute sense to universities now to lift their game in this particular area in terms of shortages.

Prof. Bell—I would just comment that I think there is quite a lot of research. I did a study for the AVCC two years ago on women in research—and I will give you that paper—which clearly shows that we lose disproportionate numbers of women after the PhD and in that age group that Professor Hugo has identified of the late 20s, early 30s. There is also an excellent study by the American academies of sciences, engineering and medicine which was prompted a couple of years ago, as you might recall, by Professor Summers from Harvard making the remark that women cannot do maths. A very good outcome of that remark was that the academies did a major study looking at that question: can women do maths? At the conclusion, of course, after an extensive search of the literature the answer was yes and then they looked at why we do not have women in these discipline areas. What they found—and I would suggest it is replicated in Australia—is that we lose women at every major decision-making point in the educational system and particularly in the postdoctoral system. There is a whole range, I think, of identifiable factors.

It is fair to say that we do not know enough about decision-making processes and we do not know enough about the complexities of organisational culture, but I could certainly identify the fact that our reward and recognition systems do not cope well in any discipline with any discontinuity. Most universities have policies that say, ‘For promotion we will assess you on the basis of your performance relative to opportunity.’ Do we have the capacity to put that into practice? The answer is no. We do it very, very badly. And we have disciplinary expectations which are often very rigid and, in fact, do not accommodate people who take time out or indeed, worse still, who combine caring responsibilities with a research career or a teaching career. We also have a whole range of other organisational factors. Younger women in the academy still tend to be pushed into the really heavy teaching loads, the invisible work. We have not learnt to say no. So we are not seeing patterns where women are being as strategic as men about their careers but then they also do not necessarily have the opportunities. I think there is a rich field there. There is a lot of evidence. And certainly the American academies’ report identified a

number of proposed interventions which, again, I think could very easily be applied to the Australian context.

Mr SYMON—To continue on with the demographic side of things, I am interested in the missing generation, as you described it, but more so in the strategies to close that gap and not reduce the quality of what you have. As a sector, it has been tried in the past and maybe it has not worked. What can be done differently in the future to address that gap? This problem with ageing demographics of people with skills concerns not just university researchers but also the wider workforce. Is there something you can do from your perspective to address that and, hopefully, make it less of an issue years down the track?

Prof. Hugo—I would say two things. One of the main reasons they are not well represented is that the jobs were just not there during the 1990s and the early 1980s. This was a period of considerable downsizing and increases of staff-student ratios and so on. In that really key area when generation X were coming onto the job market, it was not that they did not want to come into the system. I think it was a real example of the downstream problems you get when you do not have a more or less continuous intake into a particular group.

Having said that, there is no silver bullet. There is no simple one-off solution. I was saying previously that we need to get the empirical base and then put in place a number of things, and I think they probably come under three Rs. The first is recruitment in a range of areas. The second is retention, which is really crucial and at key points—particularly for women in their late 20s early 30s, and then keeping high-quality people on into their later 60s. The third, which I think never gets any attention, is return. In relation to our academic population, Australia has probably the biggest academic diaspora around the world.

Our research shows that a very significant proportion of academics do want to come back in their late 30s or early 40s, in mid-career, when they want their kids to grow up in Australia. That is an area which can be probed to make up some of that deficit, because many of those generation-X students said that, because they could not get a university or research position in Australia, they would get one in the UK, in the US or, increasingly, in Asia. There is that big group out there, many of whom are quite strongly motivated to come back, and I think we could do something there to facilitate that process.

CHAIR—Yes. In order to entice them back, though, the incentives will have to be comparable to that which they will leave behind, I presume.

Prof. Hugo—That is absolutely right. But, in a way, you are pushing against an open door with a big group of them in that they have the motivation to come back.

FRAN BAILEY—You mentioned some quite impressive figures that the UK had done in reducing their reliance on the baby-boomer generation. Apart from attracting young Australian postgraduates, was there something that the UK did, a strategic approach that they implemented, that we could learn from?

Prof. Hugo—They did a number of things, but one which stands out is what they called a ‘new blood’ program. They made money available so that universities which could demonstrate that they had a significant problem of a potential rapid loss of a significant group in a particular

discipline area could apply to get extra money to recruit people to overlap for a considerable period of time with those who were going to leave. So you had a continuity established, which would not have been there if the normal course of events had been followed. They have certainly become very active in recruiting overseas. You are right, Australians—

FRAN BAILEY—If you have any more information on that that you could provide to us, it would be very good.

CHAIR—We are very interested in this concept of the academic diaspora as a short-term measure to meet some of those long-term demands. That would be very interesting for us.

Prof. Hugo—There are a lot of dimensions to that issue and, to me, one of them is not necessarily bringing people back permanently but linking them with Australian pairs, if you like, and getting them to come back on a temporary basis, as well as sending many of our young people away on the understanding that they come back. There are a whole range of things. The high level of mobility is here to stay; it is going to increase. We have to use that to the benefit of Australia and not just stand back from it and say, ‘Let’s just let it happen.’

CHAIR—Can you develop something for us on that, because that mobility also applies to the younger generation who are at secondary school? They see the world rather than the university down the road. Maybe that is one reason why they do not want to go there but want to go out there.

Prof. Hugo—The gap year concept is a real demonstration of that.

Mr Gascoigne—An example of that is Bryan Gaensler, a young astronomer who has been quite prominent in the media over the last decade. He is a very sharp, bright young guy. He was working over in the US, but he would come back to Australia every year. He has now been enticed back and has taken up a professor’s position. He is now one of the younger members of the Academy of Science. I thought the thing that he did is what you were suggesting for getting them back—not necessarily on a permanent basis but maybe for short-term teaching exchange trips. That might be feasible.

CHAIR—Rather than worry about the mass exodus, we need to work with it, don’t we? You are right, people will come and go. And that will go to the core of our identity as a global citizen. So there you go, research into that is for the social sciences and its future. Thank you very much. It was indeed very interesting.

Mr Gascoigne—On behalf of CHASS, I would like to say that we appreciate this opportunity. We share the Academy of Science’s remarks that we believe this committee is an extremely important one, and that is why we tried to make an effective submission.

CHAIR—We hope that we can come up with a report. There were a number of issues that people are raising, such as the extension of the PhD, the need for flexibility and raising the stipend. The fact that we did not raise them here does not mean that we are not aware of them—we are very much aware of them. That is all on board and we will no doubt hear about them over the next five, six, seven or eight weeks.

Resolved (on motion by **Mr Symon**):

That this committee authorises publication of the transcript of the evidence given before it at public hearing this day.

Committee adjourned at 12.05 pm