

Internationalising the Engineering Faculty at Curtin University: A scheme to promote overseas staff-student exchanges

William Lawrance and Clive Maynard

**Curtin University of Technology
Department of Electrical Engineering
Kent Street, Bentley, 6102
Western Australia**

Abstract

The electrical engineering department at Curtin University has hosted a significant number of students from Germany. The benefits of such an experience for the students have been obvious. This paper describes a scheme we have introduced at Curtin which encourages Australian students to study overseas in order to broaden their experience and enhance their job prospects. Results of offering the program over several years, including student feedback, are described along with suggestions for how it could be sustained and improved.

Introduction

The move to outcomes based engineering programs has emphasized the significance of course learning outcomes. Curtin's course learning outcomes include:

“recognise and apply international perspectives”

“demonstrate cultural awareness and understanding”

For engineering students these outcomes are especially relevant given the global nature of modern engineering practice. Multinational companies such as ABB, Siemens, etc. offer attractive job opportunities for engineering graduates. What attributes do these companies look for in engineering graduates? Apart from technical ability they value practical experience gained outside of the university environment. For most local students such opportunities are all too rare, many complete their degree still living at home and their only experience of working in an engineering environment is the compulsory 12 weeks work experience.

Recognising that living and working overseas would be a valuable formative experience; the engineering faculty at Curtin has established a mechanism which allows students to gain overseas engineering experience with partner institutions in Germany. The outcomes expected from the scheme are as follows:

- cultural awareness
- completion of an industry based project plus an elective unit
- ability to communicate in a second language (at a basic level)
- improved “life skills” (based on independent living)

Background

One of the models for the scheme offered by Curtin is the international engineering program offered by the University of Rhode Island [1]. In this program engineering students spend one year at a university in Germany as part of a combined engineering-arts degree. This is a 5 year program and would not be appropriate for Curtin engineering students whose main ambition is to study engineering and get a job as an engineer. Our objective was to give Curtin engineering students the opportunity to spend a semester living overseas, while studying and working under supervision in an engineering environment.

German students have two paths to gain an engineering degree (Diplomingenieur). They can study at a Technical University (TU), normally a 5 year course with a strong theoretical bias or they can study at a Fachhochschule (FH), normally for 4 years. These are smaller specialised institutions which offer degree courses that are “practically relevant”. Professors at Fachhochschule must have at least 5 years industry experience as well as a higher degree. These institutions are called Universities of Applied Science and produce 65% of all engineering graduates in Germany [2]. Most of our visiting students come from these institutions, in particular Aachen FH and Karlsruhe FH.

Engineering students in Germany are normally required to spend 2 semesters outside the university, first doing a Praxis semester, which is equivalent to industry experience and then doing their Diplomarbeit, which is equivalent to our final year project. Since many students are keen to gain experience with renewable energy, Australian universities that can offer students practical experience in renewable energy are popular destinations for German students. . The electrical engineering department at Curtin has hosted such students since the early 1990’s. The benefits to the students were obvious – they worked on interesting projects, experienced a new cultural environment (meat pies and Aussie Rules) and made new friends. How could we encourage some of our students to do the same thing?

The Exchange Program

For students at an Australian technical university such as Curtin, there are obvious links with the FH institutions in Germany. Given that they usually have close connections with local industries it seemed logical to try and take advantage of these links and give our students the chance to work under supervision in an advanced industry setting. The majority of the German students visiting Curtin came from Aachen and Karlsruhe FH, which are close together on the western edge of Germany. These two institutions were visited by two Curtin academics in early 1995 and we initiated a staff-student exchange scheme which eventually led to a formal Memorandum of Understanding (MOU) in 1995. Each of these Universities agreed to host a small number of our students for a semester and find placements in local companies for them. In return we would host a similar number of their students and arrange supervised projects with one of our research groups. A basic premise of the scheme was that no expense was to be incurred by the host institution and students would remain enrolled at their home university. Obviously there had to be a limit on the number of participating students, we agreed a maximum of 5 per year would be reasonable. In order to restrict the number of students participating, and also to protect our reputation, it was agreed that to apply

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to go to Germany, students must have completed third year and have a semester weighted average over 65%.

As well as students, the MOU also encouraged staff to spend time at one of the partner universities, either with a research group or giving lectures to students. This has been popular with German academics that come to Curtin for their sabbatical and usually become involved with undergraduate teaching. Traffic in the other direction has been limited, however one member of staff has spent a year in Aachen FH becoming involved with teaching and research with their renewable energy group. An obvious barrier (both for staff and students) is the prospect of living in a society where English is not the first language. The challenge of surviving in this foreign environment is of course a very rewarding cultural experience (and a great way to learn a second language).

Encouraging participation by Curtin students

Despite the MOU there has been some reluctance by Curtin students to participate in the exchange program. Steps taken to encourage our students were as follows:

- i. *Academic credit*: the semester in Germany was deemed equivalent to a semester at Curtin, i.e. worth 100 credit points. Students are expected to undertake an industry-based project, complete with a final project report. In addition, they take one academic unit, e.g. International Business, from a limited range of units offered in English. Students are also expected to learn some German and an intensive course is provided when they arrive in Germany, this is also considered part of the academic package.
- ii. *Language unit*: one of the elective units offered in first year at Curtin is “*Made in Germany*” an introduction to German society, history and language. This unit is presented by staff from the University of Western Australia as Curtin does not offer any European languages [3]. Final year students can take the unit without enrolling if they plan to go to Germany.
- iii. *Seminars*: students returning from Germany are required to give a seminar on their project. Third year students attend these seminars and hear about the interesting projects students have been involved in e.g. developing software for an engine control unit at the Ford research centre. An added attraction for students is that they are paid an allowance by the company. This payment is normally enough to cover their living expenses in Germany.

Results

The genesis of the exchange scheme was visits by German students to the electrical engineering department at Curtin in order to carry out projects with our renewable energy research group. Since then a number of engineering staff from places such as Aachen, Karlsruhe and Kiel FH have visited Curtin. Two mechanical engineers from Aachen who visited for 6 months in 1998 were influential in spreading the scheme to mechanical and mechatronic students. Since the MOU was signed (1995) approximately 30 Curtin students have spent a semester in Germany.

Student perspectives of the scheme

While students are abroad the department keeps in touch with them via the overseas program co-ordinator. A selection of comments from students in Germany are shown below:

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"Yeah the German course is really helping all of us. Chris is having a harder time than most of us because he didn't do any study of German at all before coming here. I had done the German course run by our School at Curtin which helped a lot because I know how the ends of words change all the time."

"The main problem I think for us to learn German is that we don't actually know English! In high school or even primary school we were only taught to spell, there was hardly any emphasis on how to actually use english grammar. We don't really know what past perfect tense is - although we probably use it every day."

"Well Aachen is fantastic! so different from Australia.. Everything you look at ... it just seems special....it has soo much history behind it and that is what makes it special."

"I LOVE the bus system here it is so efficient. I have bought a bus pass for march which allows me to travel pretty much anywhere I want and I have only ever had to wait 10 minutes maximum for a bus which I think is brilliant. We need a similar system in Australia.. it is just hard convincing people to take the bus instead of their nice comfortable cars."

"The international office seems to be well funded. We all went on a two day trip to Amsterdam and had a nice hotel room to stay in etc for only 50DM! I think in may we are going to Berlin which will be GREAT! it is so amazing that everything is so close here. I might have mentioned before that I saw my first snow.. and we are all going to go to Switzerland soon to go skiing and snowboarding."

"Germany is a great experience. I am glad I took this exchange program. It's not only the life at FH that is of great experience. The entire trip is amazing. The people that I meet. The experience of living independently in a totally different environment. The social interactions in an absolute multinational community where English no longer is the commonly spoken language. This is truly the experience of a life time (Well it's the first time I have been on an exchange program after all!)."

"As for the other two, Wei Yea and Keat. Well, Wei Yea seems to barely survive, his project requires programming in Visual C++ as well, and he has no prior knowledge in this area. But he should be able to complete his project though. As for Keat, I think he is luckier with his project. He has planned for some travelling already. I shall ask them to update you on their experiences."

Effectiveness of the scheme

The objectives of the program are described above. In order to gauge the effectiveness of the program, returning students need to be de-briefed and assessed. In view of the small numbers participating a survey instrument has not been used to date, instead we have assessed the scheme using the following criteria:

(i) marking of their project report (by 2 independent examiners)

All overseas projects have scored marks above average and in some cases the marks have been high distinctions.

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(ii) personal interview

This allows students to provide feedback and describe any problems they experienced, as well as suggestions for improvement. Without exception the students we have spoken with have found the experience rewarding and enjoyable.

(iii) delivery of a seminar on their project experience

Final year students are required to give talks on their projects. In the case of the returning overseas students they additionally give a talk to first year students on the overseas experience.

(iv) subsequent employment

In all cases the students have found engineering jobs after graduation – in some cases with the company they worked for in Germany.

Present status of scheme

Currently (2005) we have 2 mechanical engineering students in Aachen but no electrical students. An emerging trend seems to be that with Australian students are facing increasing expenses in order to study they are reluctant to embark on an overseas venture which will add to their debt. This is an unfortunate outcome of the financial strictures associated with higher education in Australia. On the other hand, German students still pay only nominal fees and do not have this financial burden to distract them from maximising their university experience.

Conclusion

The scheme has great potential and all students who have participated found it a rewarding experience. The objectives of the scheme have been met and the outcomes for participants have been positive. Unfortunately relatively few Curtin students take advantage of the opportunity that is provided (our filtering mechanism has never been needed!). One avenue for encouraging students and easing the financial burden would be for German companies operating in Australia to offer a scholarship towards the air fare (this has happened occasionally in the past). Even with this incentive most Australian students are reluctant to move outside their comfort zone. A personal opinion is that the commercialisation of higher education has reduced degrees to “products” and the concept of a university degree as a broadening experience is fast disappearing. Even more concerning is that faculty are starting to accept this concept of degrees as products and our benchmark is whether the student thought the course was “good value”.

For those who think schemes such as the one described are worthwhile we would suggest that the main ingredient for success is to develop a personal relationship with someone at the partner institution who shares your enthusiasm and can convey it to students.

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BILL LAWRANCE

Bill Lawrance is an Associate Professor in the Department of Electrical Engineering at Curtin University where he has held tenure for over 30 years. He has 2 MSc degrees from the UK and a PhD from Curtin University. He lectures and performs research in the field of renewable energy. He has spent extensive periods abroad, mostly in Germany, but looks forward to retiring in Western Australia.

CLIVE MAYNARD

Clive Maynard is a Senior Lecturer in the Department of Computer Engineering at Curtin University where he has held tenure for over 30 years. He has an MSc from the University of Kent. His main field of interest is in embedded systems and he has supervised several industrial projects in this area.