



Essay

International Cooperative Education Student Exchange Program: Lessons from the Chemistry Experience

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The international cooperative education student exchange program involving students in chemistry at the University of Surrey, Guildford, United Kingdom is described. The chemistry student exchange scheme involves other universities and chemical companies in Australia, Canada, New Zealand and Japan. Chemistry students spend their 12 month professional training period working in a chemical company of the network countries. This paper will also focus on the long-established exchange for students in chemistry disciplines at Swinburne University of Technology, in Australia. The exchange program is based on a well-established network of university senior tutors and chemical company placement tutors who through their dedication to the program coordinate the student exchanges. This involves student selection, organization of exchange documentation (curriculum vitae, application forms, passport, health and safety/medical insurance), company interviews, visa or work permit applications, student travel, delivery to the chemical company, regular visits to maintain on-site monitoring of student performance, and dealing with many varied types of problems as they arise. This successful program has over the past 15 years involved the international exchange of more than 40 students and some of their experiences are reviewed. (*Asia-Pacific Journal of Cooperative Education*, 2004, 5(1), 19- 26).

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During the last 15 years the Department of Chemistry, University of Surrey, Guildford, United Kingdom has been actively involved in an international cooperative education student exchange program. Students undertaking a four-year chemistry-based undergraduate degree course spend 12 months on a professional training or industrial placement at a chemical company. Having successfully developed a network of placements throughout the United Kingdom, in the early 1980s students (especially those studying chemistry with a language) were then placed in chemical companies in France, Belgium and Germany. This has now been expanded in Europe to include Switzerland, Greece and Sweden. At the same time the Department of Chemical and Process Engineering, University of Surrey successfully established an international co-op student exchange program involving universities in Australia, Canada and New Zealand. The Department became integrated into this program and has now extended it to involve other universities and placement opportunities in Japan.

To date, some 40 or more students have spent their 12 month professional training period working in a chemical company of the network countries. For example, Surrey students work in Australia, New Zealand, Canada and Japan, the corresponding countries send students to gain industrial training in the UK. The administrative experience gained from such a program has provided many opportunities to gain knowledge about the pros and cons of such student exchanges.

Before describing the international professional training placement program in the chemical industry, a brief overview will be made of the schemes at the University of Surrey in the United Kingdom and at Swinburne University of Technology in Australia.

Professional Training at the University of Surrey

“Hundreds of companies all over the world have found that the University of Surrey’s renowned professional training program offers unrivalled opportunities” (University of

Surrey, 2003). A pioneer in integrated cooperative education (or professional training as it is called at Surrey) in the UK, over 350 organizations now provide placements for more than 1400 students each year. At least 80% of Surrey undergraduate students, across all academic disciplines, complete a professional year as part of their degree – the highest proportion of any UK university. For the majority of students this is a 12 month placement spent in the third year of a four-year undergraduate degree. Most are paid a salary by their employer (about two thirds that of a graduate level salary) and in general placement programs are formally assessed as a credit towards the final degree.

The Department of Chemistry at the University of Surrey places about 50 to 60 students per year with about five to eight of these being placed in European and Worldwide chemical companies for 12 months or more. At least 85 chemical companies offer placements for students studying for a MChem in Chemistry, or associated 'niche' degrees in computer-aided, analytical and environmental, chemistry and European experience with French or German, pharmaceutical and forensic investigation.

The main reasons why nearly all of our undergraduates in chemistry undertake a 12 month placement is due to opportunities to:

- Apply theory and practical chemistry in a 'real' working environment
- Discover in a working context what areas may be pursued for a potential future career
- Access to state-of-the-art technology in industry (especially for computer-aided and analytical)
- Develop their personal self-confidence, independence and maturity
- Earn a salary and off-set some of the debit arising from tuition fees and general university living expenses, and
- Live and work abroad.

At the end of their first year of undergraduate study all chemistry students will have a sound basic knowledge of core chemistry (organic, inorganic, physical and analytical), communication skills (including personal development planning), mathematics, practical skills in the laboratory, IT and 'niche' areas of expertise (computer language, environmental, management, French or German language, etc.). As part of a credit awarded module, Scientific Communication, they will have completed a curriculum vitae and be aware of the professional training program (coursework exercise involving the interviewing of previous professional training placement students during the Chemistry Department 'Industry Day' and the production of a Newsletter report covering the oral and poster presentations). The first year assessment does not contribute to the overall mark awarded to the degree, but acts as a pre-requisite for entry into the second year. So at the beginning of the second year (which counts to 35% of the degree award) each student is interviewed by the departmental senior professional year tutor so as to direct the student into an area that corresponds to their individual interests, academic strengths and/or career ambitions. It is at this time

that a student may express an interest in seeking an international professional training exchange placement.

Industry-Based Learning at Swinburne University of Technology

Swinburne University of Technology is celebrating 40 years of involvement in cooperative/sandwich education in Australia this year. The type of educational program offered as well as the time in industry is marketed as *industry-based learning* (IBL). Swinburne was commended for its IBL program in a recently-released Australian Universities Quality Agency (AUQA) report:

A significant feature of a number of SUT's courses is the opportunity for an Industry-Based Learning component and AUQA commends SUT for this program...The panel notes the recent approval of University-wide policies and procedures for IBL and the explicit attention being paid to some risk management issues (AUQA, 2003).

Like Surrey students, Swinburne's chemistry students spend the third year of their science degree in industry (Laslett, Crawford, Jones, & O'Connor, 1996). The chemistry IBL program has been in place for over 25 years with students coming from chemistry, biochemistry and biotechnology courses. The reasons why most Swinburne chemistry students seek industry placement are as for Surrey students. Typically, 35 Swinburne students have been placed each year with approximately 10% spending their industry year in an overseas location. The importance of thorough preparation of students for international placement was addressed at the 11th World Conference on Cooperative Education (Scofield, Laslett, & Little, 1999). As well as vital preparation in academic and practical skills, students receive guidance in cultural and safety issues. This has become increasingly important in the light of recent world events.

Swinburne students like their counterparts from Surrey have benefited from the long-standing close working relationships between the committed colleagues running the chemistry programs in both places. This has led to a highly-regarded model for running international coop programs (Reeve, Schultz, & Laslett, 1997) for which the Surrey- Swinburne link has been essential.

International Professional Training Placements in the Chemical Industry

Student Selection

Student selection for an international professional training exchange placement is not based just on academic performance. Whilst the marks awarded at level 1 are important, experience has shown that it is necessary to interview a candidate about their personal background, ambitions and justification for doing a placement abroad. In particular, it will save a lot of time dealing with future problems to establish that the student is only motivated

because they think that an overseas placement is ‘all play and having fun’, ‘getting away from mum and dad’ or ‘recovering from a previous relationship/romance that has now soured’, and so on. Moreover, a previous history of having experienced foreign travel with the family or friends does provide some degree of confidence that the student may not suddenly become homesick after two weeks on the other side of the world. However, it should be stressed that even well-traveled students will become homesick but their experience helps to overcome the problem. Personal finance should not be criteria for overseas placement selection, but in reality it does influence the student’s choice. At Surrey, a program of offering a student loan to cover travel costs has been established (paid back by the student at no interest charge to the university during their placement) so that lack of family or personal financial support does not restrict a student from the overseas program. However, those who have taken up this loan have found it difficult to repay each month as money exchange rates and banking charges reduce their effective spending and saving power.

Application Procedure

Once a student has been selected, they are encouraged not to make any applications for local placements. The reason for this is to prevent a student from suddenly leaving the application procedure at a time when an overseas academic senior tutor (say in Australia or New Zealand) is in negotiation with a chemical company. The first part of the application procedure is to complete all relevant documentation, including an up-dated curriculum vitae (with all recent academic marks), personal tutor academic references, application forms for specific chemical companies and a valid passport.

All application documentation is checked by the senior tutor/ coordinator and/or the professional training secretary before being forwarded to the respective senior tutor at the exchange university. In our program, the success is based on having established a long-standing relationship with specific chemical companies who offer placements to students on the international professional training or industrial-based learning exchange program. The reasons why these companies offer places is varied but in general covers the following (Laslett, 1996):

- Students are highly motivated and are receptive to new ideas thereby becoming productive at an early stage in the placement
- Provide a different cultural viewpoint in the company
- An opportunity to assess the potential of possible future recruitment (although maybe not for the company in that country but maybe in the UK or Australia, etc.), and
- Establishing closer links with the associated universities for the mutual benefit of both in terms of future graduate recruitment or research.

Interestingly, some companies in the UK have stated that an advantage of having an Australian or New Zealand student

is for the benefit of their company sports team, especially in the fields of cricket and rugby. One multinational chemical company, The Tetley Group (GB), also uses the program specifically for overseas graduate recruitment.

Student Interview

Once a company has viewed the student documents an interview may be requested. This is not an easy operation as student-company time zones may be 12 hours apart. However, some companies think that it is part of the interview format to contact the student at a prescribed time of 1 am in the morning. The reason for this time period is to gauge how the student performs under a situation that is not part of their daily routine. Each company has their own management plan as to the interview but important areas to cover are justification of why they want to be overseas, problem solving ability and experience and communication skills. After a successful interview the company then provides the necessary job offer and work details. All Surrey and Swinburne students are encouraged to consider the offer and hopefully provide a positive response within the week of offer. The student then discusses with the senior tutor or coordinator any problems, especially if a confidentiality agreement needs to be signed or a medical is requested as part of the job offer. The student will then send a formal job acceptance letter to the company.

Visa, Work Permit, Valid Passport

In the UK students wishing to go abroad on this program must also visit the local immigration or visa section of the respective high commission. For countries like Australia, Canada and New Zealand this means an application form, photographs, letters of job offer or student acceptance, the program details from the two respective universities involved in the exchange program and a fee must be paid to cover all of the paperwork. It should be stressed that a student must have the official visa or work permit documentation in their valid passport before applying for an air ticket. On a couple of occasions, students have found themselves traveling without the required documents only to be threatened at the arrival airport with immediate refusal to enter the host country.

Insurance and Health and Safety Issues

Before departure the student must also apply for medical insurance. For UK students this normally means applying to the university travel agent or a recognized travel and or insurance broker who provides a policy for medical cover for travel and residency in the country of the work placement. It should also be stressed that two other important areas relating to health and safety must be considered before the student starts work. Firstly, it is the responsibility of the university to ensure that their students are adequately briefed about health and safety issues prior to going out on placement (Health and Safety Guidance for the Placement of Higher Education Students [HSGPHES], 1999). All Surrey students are provided with ‘Guidance

Notes for Students on Placement (Health and Safety)' and they are given a document called 'Student Induction Checklist' which covers various task and health and safety issues. Some of the key issues are:

- Emergency procedures
- Company safety policy
- location of First Aid box
- First Aid arrangements
- Fire procedures, location of fire extinguishers
- Accident reporting
- Control of Substances Hazardous to Health regulations/requirements
- Manual handling procedures
- Display Screen Equipment regulations/procedures, and
- Protective clothing arrangements.

The above task and health and safety issues must be checked by the university senior tutor/coordinator to be in operation at a potential workplace before a student placement can proceed. Similarly, the student must go through the checklist and complete it as soon as the placement begins. All Surrey students are requested to return their completed 'Student Induction Checklist' forms to the professional training secretary within a period of 1 week of starting their placement. Also during subsequent placement visits a student will be questioned on their working knowledge of these issues. Secondly, under the UK Disability Discrimination Act (1995) and associated amendment Special Educational Needs and Disability Act (2001) it is the responsibility of the university and the senior tutor to ensure that placements are available for disabled students and that such placements are compliant under the Act. A comprehensive predeparture guidebook is provided by Swinburne for all students undertaking an IBL placement overseas.

Student Exchange

When everything is in place the time comes for the student to depart for their 12-month overseas professional training or industry-based learning placement. It is essential that the student is made fully aware of:

- Having in their possession all necessary documentation (visa, work permit, copies of the job offer and acceptance letters) at the arrival airport immigration section
- The contact details of who is meeting them at the airport (normally the host academic senior tutor and/or the industrial supervisor), and specific instructions of what not to do if the agreed people are not at the meeting place in the airport. Experience in the UK has shown that collecting students from overseas universities who have just traveled for some 20 or more hours and confronting the mass of people at Heathrow Airport in London can result in stress attacks if no one is there to meet

them. Unfortunately, on more than one occasion the collector has been stuck in a traffic jam on motorways on-route to the airport. It is therefore important to have back-up plans, like telephone numbers and specific instructions "not to leave the airport terminal"

- Specific clothing requirements for arrival. On three occasions an Australian student from Queensland has arrived at Heathrow Airport in London dressed as though they are going to the beach when it is subzero weather conditions outside the terminal
- All emergency 24-hour telephone numbers at the home and host universities and/or the placement chemical company, and
- International student travel card and or driving license.

Most chemical companies involved in the Surrey overseas student exchange professional training placement program accommodate the student in either a local bed and breakfast or hotel for a period of about two weeks so as to provide a base whilst they are getting acquainted with the company and local environment. In Australia, students may be offered accommodation at a local university that is near to the company. In the UK and New Zealand, students may quickly find accommodation in accommodation that was used by the previous exchange student. In many ways it is also important throughout the setting-up of the placement that the student has all the contact details of any previous placement or present in-place student at the company so as to benefit from their students have prepared an induction document for subsequent placement students at that company. Many of the issues covered in these induction documents are:

1. Local train, bus, underground timetables, and description of how to buy tickets
2. Local money (notes, coins, credit cards)
3. Telephone and Internet café facilities
4. Location of supermarkets, post offices and shops
5. Banking facilities and how to open a bank account, and
6. Accommodation, social guides, newspapers, etc.

In the UK two problems always seem to arise during the first week. Firstly, the exchange student has difficulty in opening a bank account as they do not have any formal documentation about their salary payment until the end of the first month of employment. In such cases, it is easier to set-up a bank account at home using a branch in the UK or involve the company human resources or personnel officer who can provide documentation for the bank. Secondly, it is important that the student contacts home (either/or parents and home university) to record a safe arrival. On a couple of occasions a telephone call from an anxious parent has necessitated various follow-up calls to the chemical company or student.

All students will be put through a company induction program on the first day in the workplace. Some issues that need to be considered are:

- Appropriate dress code for the workplace (this differs between the various cultures of the countries involved in overseas exchange placements)
- Work hours, and
- All local contact telephone numbers, academic senior tutor/coordinator and/or secretary, company industrial supervisor or human resources manager, who will monitor the student in terms of homesickness.

Student Performance Monitoring in the Workplace

All Surrey overseas exchange students receive regular site visits like those on local professional training placements. Overseas students normally start their UK placements in late November through to early March. Similarly, Surrey students will start in Australia, New Zealand, Canada or Japan between June and September. For those coming to the UK, within the first week they must complete a 'Professional Training Student Record Form' and a 'Health and Safety Checklist' which are then sent to the Surrey's professional training secretary.

Throughout the placement period there are regular departmental newsletters and student union and Royal Society of Chemistry student society documents sent to the students which enable them to be kept informed about Surrey activities. Students are also encouraged to keep in contact with their home university via email or Internet facilities. After approximately three months the Surrey senior tutor or an appointed academic tutor will arrange a date for the first placement visit. Throughout the year the student will receive three to four visits. On each occasion the visiting academic tutor will expect to be provided with an oral presentation (ca. 20-30 minutes), a detailed tour of the laboratory, and an inspection of workbooks and/or computer files.

The student must also provide details of their management timetable and any assessment documents that need to be completed on behalf of their home university. During the visit the student will also be questioned about health and safety aspects of the placement, including the fire alarm procedures, use of a carbon dioxide fire extinguisher, and Control of Substances Hazardous to Health documentation for chemicals being used in the placement. Follow-up visits will occur after every three to four months.

For many overseas students an important part of the academic visit is the need to provide an oral presentation using appropriate software packages such as Microsoft PowerPoint. Depending on their undergraduate program, many have only a limited experience of delivering oral presentations. At Surrey, all undergraduates in chemistry will have completed two credit awarding modules on Scientific Communication (at levels 1 and 2), and are therefore experienced at planning and delivering oral presentations. So it is important that all of our overseas exchange students also gain from this skills training program and for many it is a positive success story of their personal development during the placement period.

Assessment Documentation

There is no formal program of assessment common to all the universities involved in our international overseas professional exchange program. The main reason for this is that students are on different degree courses, the professional training year may or may not contribute towards the final degree award and the year of the placement may vary (normally third but some universities do send their final year students).

Assessment of the professional training year for Surrey students is based on 40 P-credits and 80 academic (level M) credits. The 40 P-credits are based on an assessment of: (1) Student performance during site visits after ca. 3-4, 6-7 and 9-11 months by both the visiting academic tutor and industrial supervisor, and (2) a poster and 12-15 minute oral presentation delivered on Surrey 'Industry Day' to an invited audience of industrialists, careers advisors, senior tutors, academic staff and students (undergraduate and postgraduate).

The 40 P-credit assessment is undertaken using documentation and a written code of practice validated by the Surrey professional training committee which oversees the operation of the University professional training program. All site visit documents are completed during a site visit by the three parties, namely the industrial supervisor, visiting senior professional training tutor or nominated academic tutor and the student. The categories assessed by the industrial supervisor and visiting tutor are listed in Table 1. All assessment grades and comments are fully discussed with the student and copies are made available to the company and student. Surrey also provides as a requirement of the academic board of studies feed-back system a confidential document which enables the student to report in writing any personal problems relating to the placement (Table 2). This is necessary as experience has shown that some students have problems with their industrial supervisor or other staff at the company and are not confident enough to speak about these problems to the visiting academic tutor.

Formal documentation reassures the student that there is a mechanism in place for direct contact with the senior professional training tutor who can then take a course of action to settle any problems with the company or student. All overseas exchange students working under the Surrey program in the UK are offered the chance to participate in the same confidentiality feed-back system.

The 80 academic (level M) credits are assessed by a committee comprising the academic tutor who made the three industrial site visits (and completed the level P assessments) and two further academic staff who are familiar with the field of chemistry covered in that particular chemical company. The oral viva consists of a 20 minute presentation followed by a 25-minute question and discussion period. All level M documents and assessments are inspected by an External Examiner, as they contribute towards 10% of the final degree award (degree: level 1-0%, level 2-35%, level M-10%, level 3-55%).

Table 1
Professional training assessment forms and industrial visit report for University of Surrey MChem students

Supervisor’s Report

Initiative	1	2	3	4	5
Interaction with other staff	1	2	3	4	5
Use of literature	1	2	3	4	5
Report writing ability	1	2	3	4	5
Time management	1	2	3	4	5
Practical skills	1	2	3	4	5

Academic Tutor’s Report

Chemical knowledge	1	2	3	4	5
Knowledge of industrial work	1	2	3	4	5
Communication skills	1	2	3	4	5
Health and Safety knowledge	1	2	3	4	5
Quality of report writing	1	2	3	4	5
Time management/Timetable	1	2	3	4	5
Overall performance	1	2	3	4	5

5=exceptional, 4=above average, 3=average, 2=below average, 1=markedly deficient

Table 2
Professional training assessment forms – confidential student feedback for University of Surrey MChem students

Confidential	Student Comment
Do you think an adequate amount of time is available with your supervisor?	
Does your supervisor involve you in all aspects of the work in your placement environment?	
Do you have enough time to work on your own?	
Chemistry with European Experience/Computer-Aided Chemistry: Do you have opportunities to develop your language or computing skills?	
Any other comments about your placement?	

Student Views of Work Placement Exchanges

The following comments are taken directly from emails sent by students who have recently been involved in the overseas professional training exchange program. They are presented as case studies.

Case Study 1: University of Waikato (New Zealand)

Twelve month placement in the UK at Tetley GB, Greenford (West London). Studying for a BSc (Tech), placement job description “Analytical Research Technician responsible for routine HPLC analysis and new method development projects”, Salary ~£13,800 (2000-2001), holiday entitlement 21 days.

University Help in Arranging Placement

“Waikato approached me with the opportunity to do my work placement overseas and handled all of the background work before I left New Zealand. Surrey provided the opportunity to work at Tetley GB and all the support I could’ve asked for...always answering emails...conducting the placement visits...really making me feel welcome. Also they invited me to join in events they were running, like the

Brecon Personal Skills Development Course, which was great.”

Documentation

“Yes, this arrived without any hassle, many thanks to Tetley who organized it”.

Arrival in the UK

“Fine, although the industrial supervisor was a bit late to the airport which was a bit off-putting when you have just left all your friends and family at home and flown to a ‘strange’ country. The two weeks accommodation that Tetley provided was really appreciated. It allowed me to settle in and start to adjust to life in the UK and let me look around at a few different living options. Everyone within the department that I was working was very friendly and the R & D ladies would go out of their way to help me settle into work. They also showed an interest in finding accommodation as well as life in general”.

The Work Placement

“It allowed me to fulfill my degree and experience another country. The work placement not only extended and developed my scientific abilities (lab book keeping, gave me a taste of research and experience on machines) but also gave me exposure to working in a manufacturing company. Personal development included self-confidence (running various tests), self-discipline, motivation and time management skills (tests done under supervision, but largely left to me to complete), teamwork, and interpersonal relation skills (relating and working with others within the company), formal writing (report required for my university), oral presentation skills (Microsoft PowerPoint presentations)”.

Overview of Overseas Placement

“The opportunity to complete my work placement overseas has allowed me to experience another culture. On arriving in England I did not know anyone and took time to adjust to being away from my family and friend network that I have in New Zealand. This made me develop and really become my own person. As time went on I made friends and began to feel comfortable in the UK. Another benefit of being in England was being able to explore another part of the globe. I tried to make the most of these travel opportunities whilst I was there. I would highly recommend an overseas placement to anyone that is considering it.”

Case Study 2: University of Surrey (UK)

Twelve month placement at CSIRO, Clayton, (Australia). Studying for a BSc (Hons) in Analytical and Environmental Chemistry, placement job description “Synthesis of new materials and analytical testing of products” - Research Technician, Salary AUD \$350 per week – for 11 months (2001-2).

University Help in Arranging Placement

“The University of Surrey (Chemistry Department) arranged the placement – they [i.e., Commonwealth Scientific & Industrial Research organization, an Australian government research institute] which enabled the placement to take place. I was also provided with the correct visa/work permit application forms, which were checked for me prior to being sent to Australia House in London. The Chemistry Department also put me in touch with a previous CSIRO placement student who gave me lots of information about travel. Swinburne University (Hawthorn, Victoria) made the finer arrangements with CSIRO – i.e. which department I would work in, who would supervise me, etc. An academic supervisor from Swinburne was also appointed who visited me whilst on placement on behalf of Surrey”.

Documentation

“I arranged my own flights and finalized details, such as start dates, with my placement supervisor at CSIRO. I collected my visa/work permit documents from Australia House”.

Arrival in Australia

“I was collected from Melbourne Airport by my CSIRO supervisor, who then took me to my accommodation. My first week’s accommodation had been arranged by CSIRO and was in the Halls of Residence for overseas students at Monash University, next door to the CSIRO site. After that I had the option of staying on (which was quite expensive) or finding alternative arrangements. I therefore moved into a university house-share, having been put in touch with one of the housemates by a colleague at CSIRO”.

The Work Placement

“The work I undertook at CSIRO took the form of novel research into nano-materials. Initially, my job was simply to follow ‘recipes’ to try to invent a new material. However, after a few weeks I was able to carry out my own research, under the guidance of a member of the team I worked with. I did this for the rest of the placement, producing a final report at the end of the year”.

Overview of Overseas Placement

“The overseas experience made me feel much more independent and I developed a greater sense of assertiveness and confidence. Spending a year mixing with people from many different backgrounds, living the ‘Aussie’ lifestyle and visiting some of Australia’s best landmarks was invaluable in making me much more aware of what’s out there if you give yourself the opportunity to find it.” I would highly recommend doing a placement in Australia as it provides an opportunity to widen your horizons so vastly in one year, while still at university. Overall, it was a fantastic year and for me meant I could come back feeling completely refreshed to start the final year of my degree program”.

Problems with the Placement

“My CSIRO supervisor could have been better briefed as to the work I could (and was expecting to) do as Surrey places great emphasis on providing structured placements. In addition, the salary or stipend I was given (AUD\$350 per week, for 11 months, i.e., no paid holiday) was not really enough to live comfortably on, being equivalent to approximately part-time pay by Australian standards. If I had not had other means it would have been impossible to have done much traveling at all, which kind of defeats the object of taking on a placement so far away. However, I was told that my pay was based on CSIRO policy not to pay more than that for non-Australian students so I would think it might be a different scenario if a placement were taken at an alternative company”.

Conclusions and Summary of Student Views about Surrey-Swinburne Exchange Placements

In conclusion, the international cooperative education student exchange program involving students in chemistry at the University of Surrey, Guildford, UK and Swinburne University of Technology (SUT), Australia provides a unique opportunity for students to gain industrial-related work experience in the chemical industry, mixed with the opportunity to live in a foreign country. The main reasons for the success of this exchange program is based on a well-established network of university senior tutors and chemical company placement tutors who are prepared to dedicate their energies to the program. Over the past 15 or more years, many important lessons have been learnt involving the process of student selection, organization of exchange documentation (curriculum vitae, application forms, passport, health and safety/medical insurance), company interviews, visa or work permit applications, student travel, delivery to the chemical company, regular visits to maintain on-site monitoring of student performance, and dealing with many varied types of problems as they arise. As illustrated in the case studies, most students feel that this type of co-operative education experience is ‘fantastic’ and provides the opportunity to develop academic and future career competencies along with broadening their personal and cultural ideas. This successful program has over the past 15 years involved the international exchange of more than 40 students, many of whom have either returned to the international company for further career opportunities, or used the experience gained to pursue post-graduate research positions.

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