



Essay

Student Experience of International Cooperative Education: Reflections on Personal and Professional Growth

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In this paper we provide a description of a New Zealand student's reflections for a work placement at a modern England-based food-industry that occurred as part of an international exchange arrangement. These reflections are presented in the form of a narrative in which the student (the first author) describes the context of the work placement and the nature of the student and employer expectations. The student considered the placement to be highly successful, resulting in enhancement of practical and personal skills. The authors attempt to identify key factors that led to a successful placement and conclude with some suggestions that they believe will enhance international cooperative education exchange arrangements of this type (*Asia-Pacific Journal of Cooperative Education*, 2001, 2(1), 11-18).

Keywords: placement purpose; placement objectives; professional growth; personal growth; science; technology

The context of this paper consists of a long-standing exchange arrangement between two tertiary education providers; namely, the University of Waikato, Hamilton, New Zealand and the University of Surrey, Guildford, England. The cooperative education programs offered by the institutes consist of four-year undergraduate science and technology degrees, both requiring a total of 12 months relevant work experience. In the case of Surrey, the degree is structured in a sandwich format and students complete a single 12-month placement between the second and fourth years of the degree (Beard, Coll, & Harris, 2001). Waikato provides two placements; one of three months duration during summer vacation between the second and third year, and a second of nine months duration at the end of the third year (Figure 1). This difference in program introduces a complication such that UK employers expect students to work for 12 months rather than nine months. Consequently, Waikato students going to the UK complete a 12-month placement instead of the usual nine-month placement. The first author completed her 12-month placement at a multinational food-based organisation in November 2000. As this was the first time she had lived overseas, it represented a significant challenge. However, the experience also afforded the opportunity for personal and professional growth. In this paper we report the first

author's reflections of her placement and seek to understand what contributed to her growth during the placement.

Context

The Company

The Tetley Group Ltd is a large private multinational company that sells green, black, flavored and instant teas to consumer and food service outlets. The Company purchases tealeaves from international estates through auctions, private sales and then blends the tea and packages the final product for sale. The Company is the leading tea brand in the United Kingdom and markets and distributes its own products to a number of countries worldwide. Tetley began as a family owned tea company in the 1800s. Ownership of the business has passed through J Lyons Company Limited, Allied Domecq, and more recently Tata Tea, an Indian company that bought the Tetley Group in March 2000. Tetley is a major multinational organization that employs some 1400 staff worldwide and has branches in India, Poland, Russia, Australia, Canada and the USA. Company headquarters is situated in Greenford, Middlesex and two processing and packaging factories are located at Eaglescliffe and Newton Aycliffe in the United Kingdom.

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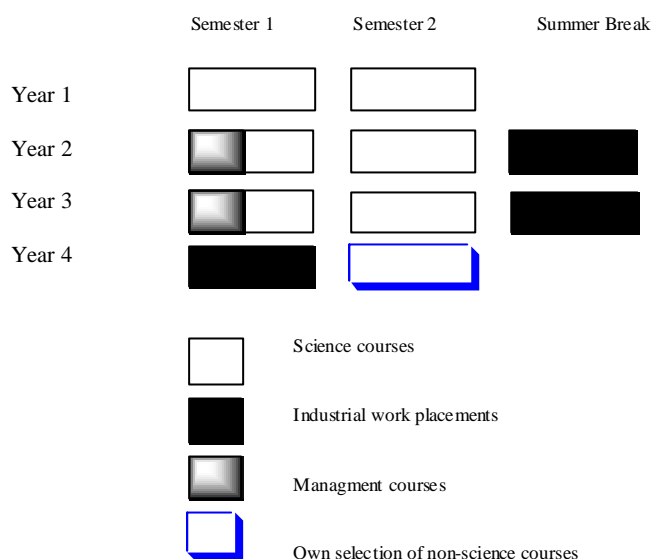


Figure 1
The structure of the BSc(Technology) degree at Waikato University

The Product

Tea is derived from the plant *Camellia sinensis*, the same genus as the common garden camellia. The two most commonly used varieties are *C. sinensis sinensis* and *C. sinensis assamica* for green and black teas respectively. Only the flush (i.e., the new shoots) is plucked to produce tea, helping maintain the plant in a continuous growth phase for greater product yields. Shoots re-grow, on average, after eight days. Fine plucking takes the two youngest leaves and a leaf bud to produce the best quality and flavor product. This is because young shoots contain more aromatic compounds and active enzymes responsible for tea flavor. Lower tea grades include up to four leaves and a bud, increasing the amount of stem and decreasing the overall aromatic content. Figure 2 shows the approximate composition of the two plucks described.

Freshly plucked tealeaves are taken indoors and spread over mesh troughs for withering. This process reduces the moisture content of the leaves from approximately 78% to 70% over approximately 824 hours. At this stage it is

important that the temperature increase for oolong and black tea is not too great, as the enzymes contained in the leaves are required in later processing, therefore fans are used to circulate the air. Cutting and rolling reduces the size of the tealeaves as well as causing cell disruption required for the fermentation stage. These processes generate heat due to mechanical and chemical energy as fermentation begins so are carried out with air currents passing over as many exposed areas as possible. Fermentation in tea processing is in fact an oxidation process that differs from alcohol fermentation, as the process does not involve microorganisms, but the action of a plant enzyme known as polyphenol oxidase (PPO). A class of organic compounds, known as polyphenols are released from the cells and mix with the enzyme. This results in the production of new compounds that create the dark pigments in black tea. Immediately after plucking, the leaves are heated with steam or pan fried to deactivate the enzyme to prevent further oxidation. Green tea is not fermented, whereas oolong tea is fermented for a short period of approximately 40 minutes and black tea may ferment for up to three hours. The leaf particles are then dried by passing them through a stream of hot air at high temperature. This step has two purposes: to deactivate remaining enzyme, and to dry the leaf and preserve flavor. Leaves enter the process with approximately 80% moisture and finish with 2.5 - 3.5% moisture. Finally, dried leaves are sorted through a series of mechanically vibrating screens into different grades. The groups are sorted from coarse to fine and are given the following grades: whole leaf, broken, fannings and dust. Fannings grade is used in tea bags. Despite its unappealing name, tea dust is the finest quality tea grade, producing very strong flavored tea that is consumed mostly in Middle Eastern countries.

Tea shoots contain a large variety of compounds as can be seen from Table 1. The stimulant caffeine is one of the most the well-known compounds in tea. However, from a physiological viewpoint, the most important components of tea are compounds known as flavan-3-ols (the monomeric forms of which are also known as catechins), and six of these compounds are present in tealeaves at relatively high (1% dry matter or greater) concentration. These compounds produce tea pigment on fermentation and are considered to provide health benefits. It was thought for many years that

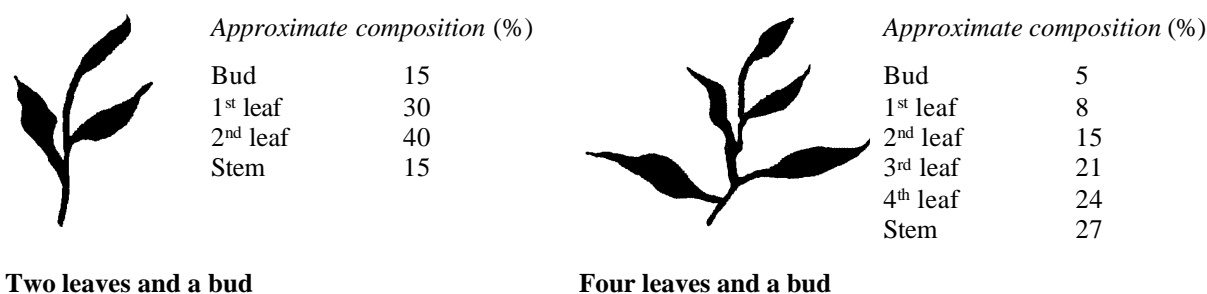


Figure 2
Tea composition of different plucking grades

black tea was unhealthy due to the amount of caffeine present and the positive correlation between intake of tannins (polymeric forms of the flavan-3-ols) and cancer of the oesophagus. More recent studies have found that flavan-3-ols may be beneficial to health by providing antioxidant properties (Roberts, 1962).

Placement Purpose

It is evident from the above description of tea production and the composition of tealeaves that there is much chemistry in this popular beverage. Tetley is a market leader in the tea industry, and conducts research and development to maintain its competitive edge. The increasing interest in healthy eating and drinking means that the Company needs to stay abreast of modern technology, research into the health benefits, and other important issues about their products. As a consequence, the Company strives to improve their product and find new and innovative means of manufacture, quality control and presentation of tea. This work is spearheaded by the *Worldwide Research and Development Department* (WWRD), located at the Greenford site. The Department activities are varied and include research projects, new product and packaging development, analytical methodology, information acquisition/dissemination, due diligence activities and technical support. The 12-month placement was within the Worldwide Research and Development Department; the placement is described as a narrative in the first person.

The Department is divided into three groups all based at Greenford. *Tactical Research and Development* focuses on short-term projects of two years or less, while *Strategic Research and Development* conducts long-term projects of more than two years. My placement was as an analytical chemistry technician within the third group, the *Analytical Research and Development Group*. This group carries out

the chemical analyses required for the Department. This includes routine quality assurance, technical assistance, analytical methodology and research activities. No external analytical contracts are undertaken by the Department, however, through links with the *International Tea Committee* Tetley participates with *ISO Methodology Development* for tea analysis. My role was to assist with laboratory duties and use modern instrumental techniques such as *High Performance Liquid Chromatography* (HPLC) and *Spectrophotometry* for tea analysis (described in detail below). During the placement I contributed to three major projects to varying degrees; *Project Windows*, *Project Orange*, and *Project Bucks*.

Project Windows

Project Windows involved the configuration of a Windows-based software interface for factory instrumentation. Tetley uses a rapid analysis instrument unique in the tea industry to analyze moisture and caffeine content in tea blends. This is a cost effective and efficient method that reduces laboratory analysis that would otherwise be required. Traditionally, manufacturing staff used a DOS based program to run the instrument. Project Windows involved the purchase of new Windows operated software that provided a more user-friendly interface and enhanced data handling capabilities. The software required customization to the specifications for tea analysis; and this was the aim of the project. The Project had eight tasks as detailed in Table 2. My involvement with this project consisted of customizing the software for Tetley and making the interface more user-friendly for the manufacturing staff. I was able to create a step-by-step process, and prepared and presented the software to the factory staff. After demonstrating at practical training sessions at WWR&D I was then involved in moving and installing the computer at its new location in the *Tea Buying*

Table 1

Chemical composition of Assam tea shoots (Roberts, 1962)

Component	Dry weight (%)
Flavan-3-ols (monomeric & polymeric)	17-32
Flavanols and their glycosides	3-4
Leucoanthocyanins	2-3
Phenolic acids	30
Caffeine	3-4
Amino acids	4
Carbohydrates	4
Organic acids	0.5
Volatiles	0.01
Polysaccharides	14-17
Protein	15
Inorganic compounds	5
Cellulose	7
Lignin	6
Lipids	3

facility. Once the software was live, I was responsible for providing assistance and general trouble-shooting with the computer and monitoring program use. I also implemented a sample identification labeling system for teas sent to the analytical laboratory. Previously, unlabelled samples were sent to the laboratory and it was difficult to determine what analysis was required. The labels provided check boxes that indicated the analysis required. The labels were also used to seal the sample bags, an improvement on the conventional staple seal that allowed moisture to enter the sample.

Project Orange

Project Orange was an exercise in determining the amount of polyphenols in green tea. It involved extracting the polyphenols from green tea and carrying out a chemical assay that produced a color change detectable by an instrument known as a spectrophotometer (i.e., an instrument capable of measuring intensity of UV-visible radiation). The tasks required for Project Orange are summarized in Table 2. Project Orange was a multi-phase research project that I was involved in throughout the placement. I carried out all the experimental procedures, entered data into a pre-formatted *Microsoft Excel* spreadsheet for interpretation. Due to the commercial sensitivity of Project Orange, results and data cannot be

presented here. However, the Project established that the spectrophotometric method described previously when followed consistently can be used to successfully determine polyphenol content in green tea leaves

Project Bucks

It is widely believed that coffee contains more caffeine than black tea. However, current knowledge of caffeine levels in green tea is not very comprehensive. Project Bucks aimed to address this problem by developing a comprehensive instrumental method for the analysis of caffeine in tea. The tasks involved in Project Bucks are listed in Table 2. The project involved the use, and comprehensive knowledge of HPLC. HPLC is a sophisticated instrumental method of analysis that involves separation and identification of substances. Substances under analysis are dissolved in one phase, the mobile phase (liquid or gaseous), that moves relative to a stationary phase (typically a solid or high viscosity liquid). The substances of interest interact with the stationary phase to differing degrees as they are carried along in the mobile phase. This differential interaction leads to separation as the samples are retained to differing degrees by the stationary phase. HPLC is a complex technique and so I attended a practical HPLC training course at the University of Surrey in January 2000. The course involved two self-learning computer programs:

Table 2

The tasks required for *Project Windows*, *Project Orange* and *Project Bucks*

<i>Project Windows</i>	
1	To configure the program with settings customized to Tetley products
2	To create a library file of analyses for the computer to identify products and errors
3	To generate an archive of data for each blend collected by the instrument
4	To simplify the program for ease of use by factory workers
5	To train factory workers on using a computer and teach how to use the new software
6	To compose a manual describing how to modify the software, tailored to the specific needs of Tetley
7	To monitor the use of the software and ensure correct use
8	To continuously add new blends to the program for analysis
 <i>Project Orange</i>	
1	Prepare homogeneous tea leaf samples by grinding to powdered form
2	Extract polyphenols using 70% methanol/water solvent.
3	Determine polyphenol content by Folin Ciocalteu spectrophotometry against gallic acid standards
4	Find the moisture content of leaf tea samples
5	Calculate total polyphenol content
 <i>Project Bucks</i>	
1	To register all samples on a Laboratory Information Management System (LIMS)
2	To prepare samples by grinding
3	To determine the moisture content of the samples
4	To extract caffeine from the ground green tea
5	To determine the levels of caffeine in tea against caffeine standards by an ISO High Performance Liquid Chromatography (HPLC) reference method

one providing a theoretical overview of HPLC/chromatographic methods, and the other a practical troubleshooting guide. I also gained hands on experience with manual sample injections, and was given a demonstration of areas that typically cause problems during HPLC analysis. I returned to Tetley and practiced the extraction method using audit samples then used the HPLC to determine the caffeine content. A selection of green tea samples of various origins were analysed and the caffeine data used to create a database. Further data will be added to the system as more samples become available.

The Development of Placement Objectives

My challenge and expectation was to enhance my competency and capabilities during my placement at Tetley. Spencer and Spencer (1993) view competency as an underlying characteristic of an individual that is manifest in superior performance in the work place as evidenced by their behavior in variety of work contexts. Likewise, Birkett (1993) sees competency as the way in which an individual draws on inner ability to perform tasks in specific work contexts. Rainsbury, Burchell and Hodges (1999) propose a model of competency in which an individual's competence is composed of individual attributes, task performance, and the performance contexts (Coll & Lay, in press). Individual attributes, according to Birkett (1993) comprise technical, analytical and appreciative skills, whereas behavioral skills consist of the so-called soft skills such as personal, interpersonal and organizational skills. Interestingly, employers rate the so-called soft skills highly, compared with technical and academic skills (Burchell, Hodges, & Rainsbury, 1999).

To maximize my personal growth during placement, I set myself a series of placement objectives based on employer expectations and the notions of hard and soft skills described in the literature cited above. These objectives comprised specific technical tasks negotiated with my employer, and personal objectives that I felt would enhance my personal growth (Table 3). In other words, I sought to gain some 'hard' or technical skills such as knowledge and

expertise in modern instrumental methods and information technology skills, along with behavioral skills, such as interpersonal communication, data recording and so forth. The placement objectives (Table 3), comprising a mixture of student and employer expectations, were negotiated at the beginning of my placement, and re-examined throughout the placement.

I feel that I made significant progress towards most of these objectives and learned much during the year. The description of my reflections is based on the technical skills and soft skills detailed in Table 3. In the next two sections, I reflect on my progress in meeting the placement objectives detailed in Table 3 as a result of my participation in the three projects that formed the basis of the placement.

The Development of Technical Skills

I learned a lot about the tea industry through my visits to the Tea Buying Department, the factory and in the laboratory. Having little previous knowledge on tea, I found the manufacturing and blending concepts very interesting. Through my work on HPLC, I was able to analyze the differences in green, oolong, Darjeeling and black tea and learn about the different chemical compositions due to processing. Visits to the Tea Buying Department and the factory provided me with an insight into the production process and helped to clarify commercial pressures.

I anticipated using HPLC a lot during the year and gained much first hand experience with auto-sampling and manual injection processes. I enjoyed using manual injection HPLC during caffeine analysis because I had to check all the tubing and filters at start up and monitor the pressure for blockages or leaks. This meant I came to know the instrument in a much more detailed fashion than if I had dealt with a fully automated instrument. Likewise, I learned valuable skills from spending time putting pieces of the HPLC together. From this experience, I found that I learn more effectively from practical aids than aural or visual aids.

Project Orange provided an opportunity to learn how to

Table 3

Placement objectives identified at the beginning of the placement

<i>Technical Skills</i>	
1	Gain insight to the tea industry, and in-depth knowledge of the plant <i>Camellia sinensis</i>
2	Increase knowledge and general laboratory practical skills, with an emphasis on instrumental methods of analysis, particularly HPLC
3	Improve IT skills for a variety of applications programs, such as Minitab, ABC-Flowcharter, HPCChemstation, Microsoft Word, Excel, & Power Point
<i>Soft Skills</i>	
1	Improve my oral presentation, time management and organizational skills
2	Enjoy a different culture and lifestyle and form new and lasting friendships with people who I meet during my placement
3	Improve my laboratory notebook presentation and layout

change properties of machine operation in order to maximize analysis. I was able to trace the effects of changing the instrumental conditions as I developed the method. I learned how to identify compounds in complex machine outputs, and spent a lot of time analyzing data and identifying compounds manually.

In addition, I had the opportunity to modify the product lists on the computer for the rapid tea analysis instrument during Project Windows. I gained confidence using this instrument during the year, and reached a reasonable level of competence. I began my year not understanding how the machine worked at all, but I gained a greater understanding with time and was able to develop a user guide with step-by-step instructions and visual aids.

Development of Industry-Specific and Generic IT skills

I was introduced to two new industry-specific computer programs, *ABC-Flowcharter* and *HPChemstation*. I used *ABC-Flowcharter* to create information guides for the tea buying staff who use the rapid tea analysis instrument and the computer. This was a very useful program and I found it user-friendly. *HPChemstation* is the interface that Tetley uses for all HPLC instrumentation. This program collects, integrates and calculates data from the instruments. I found the interface somewhat temperamental at times, but overall it was a useful program once the settings were correct and reduced the time spent on calculations for caffeine analysis.

I made extensive use of the Microsoft suite of programs; particularly *Microsoft Excel* and *Microsoft Word*. Using *Excel* and *Word* regularly, I found more functions to help me with my work. I found using *Excel* to make templates especially useful when I was collecting and calculating data for Project Orange. Once I had established the table size and the formulae required, I was able to enter the raw data and the template would complete the calculations. In addition, over the year, I have learned how to use many of the functions on *Microsoft Outlook*. I made more use of the tools in the organizer and also found creating address books, arranging appointments, setting up meetings and making bookings or orders hassle free routine tasks. I also gained basic experience with *Microsoft PowerPoint* for creating presentations for departmental and industrial placement presentations. I was able to do a presentation for my industrial tutor and during *Industry Day* (a one day seminar series where placement students present their work to staff and students at the University of Surrey). I used these opportunities to practice using appropriate software to get my message across to the audience in a professional manner.

I used *Minitab* (a sophisticated statistical computing and graphing software package) for data analysis near the end of my year with Tetley and found that the package was much easier to use than when I learnt during my first year at university. However, I felt that my skills in statistical analysis were not sufficient to enable me to use the program with confidence. I felt that I could have used this program much better with more reference material and my lack of confidence was most likely because I had not used my statistics much since my university course. I found it

difficult choosing suitable references because we had to borrow books from the British Library and I was not able to review them first.

The Development of Soft Skills

I had a number of opportunities to practice my oral presentation skills during the year and each time I learned something different. The feedback after each presentation was constructive and I now know that areas I need to focus on are timing, presentation consistency and use of other visual aids such as flip charts and handouts. Time management and organizational skills were aspects that mostly affected my daily plans rather than departmental function. I set myself tasks to achieve for the day and approximate timings so I could get several tasks completed in the day. While changes of plan happened occasionally, I was able to adapt my schedule to fit in other tasks as they arose. My involvement in three major projects challenged me to be assertive and demonstrate professional conduct with the parties involved.

When I first arrived at Tetley, I was recommended to read *Writing the Laboratory Notebook* (Kanare, 1985), that provided guidelines on how to present experimental data, what information to record, how to format pages and the style of writing to be used. While I did not manage to keep a perfect laboratory notebook, I feel that I have made steps towards improving my presentation since my last placement. My entries were more structured, formatted and consistent. I found looking back in my laboratory book was relatively hassle-free and I tried to make more observations. The most obvious improvements have been my skills in making references for calculations to raw data in my laboratory book and keeping reference of where results are logged. My style is still developing and I feel that I will still need to work on it longer to consolidate it.

Reflections on Practical Aspects of the Placement

In the above discussion, I have reflected on my professional and personal growth. These matters were also impacted upon by some purely practical challenges related to the placement process itself. In this section I provide some reflections of the logistics of my placement experience. It is pleasing to record that the Company has responded to many of these issues in a very positive manner.

When I first arrived in England, I felt quite homesick especially near Christmas. To further compound this feeling I did not know anyone and found that attitudes and lifestyle in London were very different from what I was accustomed to in New Zealand. Because of this it took me some time to settle in and feel comfortable in my new environment: but I feel this reaction was not atypical for someone who had not experienced this before. I found it difficult to meet other people and make friends my age outside of work, but I was able to make acquaintance with some older people in the local area. Flating (a new experience for me since I had previously lived at home)

definitely helped me to feel more comfortable, and I was pleased that I got on well with my flatmates.

I was a little disappointed that I was not able to share the entertaining lifestyle as much as I had anticipated. In spite of this disappointment, I appreciate what I experienced in London and the UK as a whole. It has given me life skills that I unfamiliar with before going on placement. Being immersed in a different culture has shown me the positive and negative aspects of living in both England and New Zealand and I am now better able to appreciate the differences.

Over the years, international students working at Tetley arriving before Christmas have begun their placements earlier and earlier to the point that my arrival was the earliest for the Company, being at the end of November 1999. As there was no handover time between students I feel that the date of arrival before Christmas is unnecessarily stressful on the student. Finding accommodation and trying to settle into a different country by oneself during the festive season is a high-pressure situation on all accounts and even causes some concern with Departmental staff. My recommendation is to have all students arrive early in the New Year. The benefit of this is that Departmental time and effort can be equally devoted to both students at the same time and there is more opportunity for the students to get to know each other. To facilitate this change with minimal disruption to Departmental activity, the date of arrival should be moved back by at most two weeks at a time. For students to arrive at similar times it would be possible to achieve this within three years of implementation.

I thought coming to work on the first day was a very good idea. While I was tired and jet lag was beginning to set in I still found meeting the people in the Department was a good way to deter the onset of homesickness. However, I feel that there should be some time allocated for the student to set down their bags and freshen up first as this will help to keep them awake and feeling better after such a long flight.

In addition to the Human Resources (HR) induction to Tetley and meeting WWR&D staff on the first day, I think that a student starter pack should be supplied. HR provided a folder for all new employees to introduce the company activities, managers and general and health and safety practices. By chance, I picked up a useful pamphlet explaining how to use the London Underground system. I found this invaluable because I was unfamiliar with this type of public transport system and would not have known what to do otherwise. It took a couple of weeks before I discovered that comprehensive bus timetables and maps were available for the local area. For the next student I gathered some important and useful information on public transport in the local area and Central London. Also included were pamphlets for getting student discount cards and some travel ideas to help raise awareness of the many offers available to young people.

The *student box*, a cupboard full of useful items for students, has expanded over the years as people have contributed items such as bedding, towels, hangers, lamps, radios and other flatting and travel essentials. I was shown the student box four months after arriving and found that

there were many items that I purchased unnecessarily. I suggest that current students make it their responsibility to maintain the student box and be responsible for showing arriving students where they can borrow things for the year.

I feel that the induction program has potential to be a very useful tool for getting students to know the role of staff in the department. I think that the program might be more effective if the interaction between the student and staff member is explained. The Tea Buying Department is an area where I think this will be of particular use. Student interaction with Tea Buying is quite high but the extent of the induction program goes only as far as a tea tasting session. It was only been through doing work for particular tea buyers that I learned what they do and why my work is important to them and in turn, production. I would like to see students formally introduced to the Tea Buying Department and the interaction between them, WWR&D and students clarified. To make more efficient use of departmental time, I also suggest that the students attend the inductions as a group. This will also ensure that the students will receive the same information.

In the WWR&D library there are a few books on statistics though they are not useful for explaining or giving examples for the many statistical tests available in Minitab. Minitab help was good for brief discussions but not comprehensive for explaining the variations of data types for a specific test. This made it difficult to use the program for data analysis to its full potential. To compound the problem, the inter-loan scheme for book borrowing was only useful if you knew exactly which book was required, as it was not possible to browse the contents of the book before requesting it.

It is easy to suggest that the library purchase a book that will cover all the possible tests that can be used on Minitab, however, it is unlikely that a single book covering all appropriate topics might be found. Other considerations include readability and use of examples. For basic statistical analysis, *Statistics A First Course* (Sanders, 1995), covers topics such as hypothesis testing, confidence intervals, sampling, control charts, regression and correlation and I have found it very helpful with many examples and exercises that applied to project data for the projects I was involved with.

In hindsight I can see that my holidays were not spread very well over the year. I recommend that students distribute their holidays throughout the year so that there is a balance between work and relaxation such that it does not interfere with project activity.

I was fortunate to have had a computer loaned to me by the *Business Information Systems Department* during the year. This was of great help in completing Company and University reports. Without the computer I would not have had sufficient time to complete the work on-site during lunchtimes and before and after work. As it is not a Company obligation to allow time for university commitments, I would support the idea of loaning a computer to students who come for placement with the Tetley Group, and I think this should be considered as an extra benefit associated with the job.

Implications for other Practitioners

The reflections described in this paper provide some suggestions for placement coordinators and employers involved in placing students in overseas placements. Previous work has provided some insights into the benefits and barriers of internationalization of cooperative education programs (Coll & Chapman, 1999, in press). The present paper contributes to the literature by providing an in-depth understanding of the challenges an individual student confronted on a placement outside her own country. Whilst these issues are specific to the context in which this placement was conducted, this essay provides an insight into the sorts of problems students may encounter in these settings.

The setting of, and continuous refinement of, placement objectives proved to be highly beneficial. The employer had clear objectives and motives for the placement; namely, the successful completion of the specific tasks detailed in Table 2. In addition, the employer expected to see rapid increase in skill in the use of instrumentation and to see this skill result in a more independent worker. Refinement of objectives was necessary as the needs of the employer changed due to, for example, commercial pressures. Furthermore, the employer had an expectation that the student would be able to interact appropriately with a wide variety of staff and quickly develop good interpersonal skills and presentation skills. As a student, I developed skills in some areas, experience and reflection revealed other areas requiring improvement, which were then targeted for remedial action. This process of setting objectives, and constructive feedback proved to be the key to personal and professional growth.

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