The role of cooperative education in developing environmental science skills

MURRAY CULLEN*
School of Environmental Science and Management, Southern Cross University, PO Box 157 Lismore, NSW 2480, Australia

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A review of 65 position descriptions for environmental science students who participate in a cooperative education program identified 211 different attributes and skills required in the workplace for environmental science graduates. Evaluation surveys from 70 students were used to compare the attributes and skills identified from the cooperative education process. There was considerable demand for skills not typically taught in university programs. These included workplace skills such as occupational health and safety rules, appearance, punctuality, workplace language, and office skills such as photcopying and telephone answering. The collection of this information has been useful in developing graduate attributes, and at the same time has been important in establishing and reinforcing teaching to ensure relevance of the study program to the workplace, and hence the student's employability (Asia-Pacific Journal of Cooperative Education, 2007, 8(1), 37-52).

Keywords: Cooperative education; environmental science; graduate attributes; skills; employability; Australia.

The benefits of work integrated learning for students and host organizations participating in these programs have been well documented (see, e.g., Dressler & Keeling, 2004; Coll & Eames 2000; Braunstein & Loken, 2004). Typically benefits are identified for students, the host organization, and the academic institution. Coll and Eames (2000) summarized several sources and listed benefits for students including financial reward, career enhancement, cost savings, and collaboration between the employers and the academic institution. Wilson (1989) found that the participation in cooperative education programs helped students by clarifying their career goals, completed their studies, were better academically, had greater self confidence and knowledge of careers and workplace requirements, and gained higher salaries. Co-op students tend to have better job seeking skills such as resume writing and interview skills (Mariani, 1997). Bentley and Broons (1999) identified four key themes where benefits to students were found. These were personal growth and maturity, work skills, academic impact, and employability.

Braunstein and Stull (2001) described benefits for the host organization including the hiring of people with special skills, bringing new knowledge into the organization, fulfilling social responsibilities and providing supervisory experience. The benefits for the host organizations of co-op programs include screening and hiring of potential employees, interactions with the universities, cost savings, and the hiring of students for special projects (Braunstein & Loken, 2004). Employers have also reported cost benefit advantages as a result of participation in co-op (Chapman, Coll & Meech, 1999).

Benefits for the academic institution include student recruitment and enrolment, curriculum development, internationalization, staff development and financial benefits (Weisz & Chapman, 2004). Bentley and Broons (1999) suggest that participation in co-op programs may also increase motivation and commitment of students, a benefit for the institution,

*Correspondence to Murray Cullen, email: murray.cullen@scu.edu.au

whilst Calway and Murphy (1999) found there was potential benefits for curriculum development and marketing of study programs. Cooperative education also can strengthen ties with academic goals through assessment (Hartley & Smith, 2000), and can improve the outcomes of Graduate Destination Surveys which can be used in student recruitment (Weisz & Smith, 2005).

One area in which co-op contributes to the academic institution is in the development of student attributes and skills. Weisz (2000) described a study which was designed to measure attributes and skills of a pilot group of economic and finance students. It was found that employers placed great importance on generic skills in co-op students that they seek to employ. The rankings of attributes by students and employers differed, but Weisz concluded that the development of generic skills in students was important, not only for participation in co-op, but also for graduate employment. Community engagement is another benefit described by Langworthy (2005) who commented that the ongoing review and evaluation of performance and information seeking from the community (through work placements) was essential in developing graduate attributes.

Gault, Redington and Schlager (2000) summarized four career skills identified by employers, recruiters and career development staff that could be obtained through co-op. These were: communication skills, academic skills, leadership skills and job acquisition skills, and a study of 446 business students found that students with co-op experience were better prepared for employment, gained employment quicker and experienced higher job satisfaction levels.

Bennett, Dunne and Carré (1999) provided a historical review of the development of generic skills and attributes and discussed a model of course provision incorporating workplace skills into a higher education course. They found a complex relationship between core and generic skills, as well as considerable cross-discipline variation between core and generic skills. Patrick and Crebert (2004) found that engineering student's generic skills and abilities were greatly enhanced through the provision of a structured work placement in the degree. However, there was no reported feedback from the work placement into the development of graduate attributes.

Many of the examples cited above are from business and commerce students, and the environmental science subject area appears to have been somewhat overlooked. The role of education in the environmental science area has been examined by Laslett and Zegwaard (2004) who described the history and development of education in science and technology, and identified and described a number of programs. The benefits of education in environmental science education with respect to institutional goals were researched by Scholz, Steiner and Hansmann (2004). They used three categories of qualifications: scientific knowledge, general abilities (which included teamwork, management, work techniques, communication, and presentation), and environmental problem-solving ability. They found that cooperative education (referred to as internships in the paper) enhanced key scientific qualifications and skills as well as general abilities such as student's ability to operate independently, detect relevance, and solve environmental problems. They also found that co-op was also important in training for research, and concluded that co-op in environmental sciences promoted a broad range of student's skills and knowledge.

The higher education sector in Australia has had to place increasing emphasis on the development of generic skills. This importance has been influenced by three factors according to Bath, Smith, Stein and Swann (2004). These include the popular concept of lifelong learning, greater focus on education for employment, and the response to the need for measured outcomes as part of quality assurance measures required by the Australian Government. The government has also foreshadowed calls in future for evidence that universities are actually achieving these claimed graduate outcomes (Barrie, 2006). Barrie (2006) also comments that there has been a paucity of research which examines the presumed conceptual basis of the notion of generic graduate attributes.

In response to the Australian quality assurance measures, Southern Cross University has developed a set of generic graduate attributes for the university. These can be summarized as (Adapted from Southern Cross University Academic Board Minutes, 2005):

1. Intellectual rigor and a commitment to excellence
2. Creativity in response to intellectual, professional and social challenges
3. Ethical understanding and sensitivity to moral issues and conflicts
4. Command of an area of knowledge
5. A commitment to lifelong learning
6. Effective communication and social skills, and
7. Cultural awareness.

Individual schools within the University are developing their own set of graduate attributes and skills as a subset of the University attributes.

As the above review indicates there a variety of terms used to describe attributes, skills, knowledge, and values. This can at times be confusing, so for the purpose of this paper, the inclusive term competencies will be used. The New Zealand Qualifications Authority cited in Rainsbury, Hodges, Burchell and Lay, (2002, p. 8) defines competency as "the ability of individuals to apply knowledge, skills, attitudes and values".

As part of a curriculum review process being undertaken by the School of Environmental Science and Management at Southern Cross University, Lismore, Australia, the co-op program is being used to help provide the establishment of graduate competencies.

The Environmental Science course at Southern Cross University offers students who have completed at least two out of the three years of the study program the opportunity to participate in a cooperative education program in which they apply for vacation volunteer work with a list of participating organizations. Each participating organization provides a position description listing the essential and preferred skills they require. The position descriptions are usually taken from recently advertised positions. Some descriptions are brief, but over the eight years the program has been in operation host organizations have been encouraged to provide a realistic position description. The students spend a period of eight weeks with the host organization, usually unpaid. For this they receive course credit of one unit towards a degree program consisting of 24 units. The co-op unit of study is called Internship Study, and is an elective (non-compulsory) unit.

By analyzing advertisements for student placements and examining students' reports on their workplace experience, a list of graduate attributes and skills is being developed. This paper documents the processes involved, presents the results of analysis and examination, and comments on the benefits of co-op for the development of graduate competencies, thus providing a valuable link between the university and industry.

RESEARCH METHODS

Position Description Analysis

An extensive review of 65 position descriptions for workplace learning was undertaken as part of the curriculum review process. The 65 position descriptions were chosen from the 2005 vacancies. The review identified the different duties, knowledge, and techniques required in the workplace for environmental science graduates. This information was obtained from the general position description as well as the listed essential and desirable competencies. These were summarized into appropriate subject areas, and frequency information calculated.

Student Evaluation Survey

On completion of the work placement each student is required to complete an evaluation survey form (Appendix). This form contains general questions about the position, the host organization, and demographics. There are evaluation questions on learning and the workplace: who they learned from and how; what did they actually learn in the workplace; and a general evaluation. The survey was designed primarily for evaluation of the cooperative education program, but pre-testing indicated that it was useful to evalaute learning attributes and skills. The survey form was adapted from Eames (1999). Copies of the survey form are available electronically from the author.

The questions that were used to extract data for this paper were:

> D1. What are the things you learnt in your placement?
> D3. What were the skills you had learnt in your studies that you used in your placement? Relate them to the University units you have studied, and
> D4. What were the skills you learnt in the workplace that you did NOT learn in your studies?

Survey forms were lodged by 70 students. The survey forms were read and then categories for each question were defined. All survey forms were then re-examined solely by the author to ensure coding reliability, a process recommended by Kaid and Wadsworth (1989). The completed survey forms were examined and the competencies listed by the students were collated, summarized and frequency information obtained. While recognizing there are potential problems using this qualitative method of content analysis (Linn, 2004), this was the most appropriate method available. Content analysis does provide a means for quantifying the content of the student reports, which tend to be straightforward as well as obvious and simple (Denscombe, 1999).

RESEARCH FINDINGS

Position Descriptions

Analysis of 65 position descriptions identified 15 different competencies required in the workplace for environmental science graduates (Table 1). This information was extracted from the general position description. Communication skills were the most required with 26 of the 65 descriptions listing them. Because a number of organizations offered multiple positions in Fisheries and Aquaculture Management, the duties associated with this strand (fish husbandry, fish tank maintenance, etc.) were more frequently listed.

Table 2 shows that 12 essential competencies were identified from the position descriptions. Communication skills were listed by 34 organizations. In many cases the practical skills such as a car or boat license (28 listings) are not included in the environmental science curriculum, however, students are encouraged to gain these skills. These same competencies are listed in Table 3 which shows the *desirable* criteria, as opposed to *essential* criteria extracted from the position descriptions.

TABLE 1
Summary of competencies required in position descriptions

Competencies	Frequency
Communication skills, including oral & written	26
Fish husbandry, including feeding, handling, disease monitoring, breeding etc	23
Laboratory skills – various	20
Social survey skills, including survey development, undertaking, and analysis but not data entry	19
Data handling skills including entry and analysis	17
Fish tank & pond construction & maintenance	16
Education skills, including developing and implementing education programs	16
Planning skills, development of strategies	14
Workplace skills, including knowledge of occupational health and safety rules (OH&S), providing support, teamwork etc	14
Environmental surveys, including birds, animals, vegetation, corals, nests, etc.	14
Liaison with various bodies and organizations	10
Geographic information systems (GIS) skills	7
Office skills, phone, photocopy, etc.	6
Knowledge of legislation & regulations	5
Computing skills, not GIS	4
Total	211

TABLE 2
Summary of *essential* competencies required in position descriptions

Essential competencies required	Frequency
Communication skills	34
Practical skills, e.g., car license, boat license, first aid, etc.	28
Computing skills (Not GIS)	19
Knowledge of government, legislation & regulations, safety and ethics	18
Project planning and implementation, including time management	16
Flora/fauna survey skills	12
Ability to work in a team	10
Interest and/or awareness in general area	11
Ability to work independently	8
GIS skills	6
Workplace issues – appearance, punctuality, confidentiality	4
Social survey skills	4
Total	136

TABLE 3
Summary of *desirable* competencies required in position descriptions

Desirable competencies required	Frequency
Practical skills, e.g. car license, boat license, first aid etc	9
Computing skills (Not GIS)	4
GIS skills	4
Interest/awareness in the area of employment	3
Flora ID skills	2
Total	22

Evaluation Survey Results

Evaluation forms from all 70 enrolled students were received. The answers to the questions D1 and D4 (D1. What are the things you learnt in your placement? D4. What were the skills you learnt in the workplace that you did NOT learn in your studies?) are summarized in Table 4. In total, 19 areas of competency were identified by the students that they gained or enhanced from the workplace experience. In addition to the practical skills obtained whilst working, other major areas of competency identified were communication, administration, and computing, including GIS, skills.

The responses to Question D3 (What were the skills you had learnt in your studies that you used in your placement? Relate them to the University units you have studied) are summarized in Table 5. Increased subject knowledge was the single competency most noted with 16.5% of total responses. Report writing skills, communication and community consultation skills, make up 27% of total responses indicating the importance of communication skills in the higher education sector.

TABLE 4
Student-identified competencies acquired in the workplace from the survey

Competencies Acquired	Frequency
Practical field-based skills (boat skills, tank maintenance, fish & plant identification, etc.)	27
Administration skills (workplace language, report writing, etc.)	25
Communication skills (oral and written)	22
Interpersonal relationship skills	20
Computing skills (not GIS)	11
GIS Skills	10
Time management	10
Increased subject knowledge	9
Community consultation skills	8
Education skills	8
Permit and funding application skills	6
Laboratory techniques	6
Relevance of university study to the work situation	4
Other (all single occurrence)	3
Risk assessment skills	2
Job seeking skills	2
Total	173

TABLE 5
Student-identified competencies acquired at university and used in the workplace from the survey

Competencies Acquired	Frequency
General subject knowledge	26
Computing skills (not GIS)	19
Practical field based skills	17
Report writing skills	12
Communication skills	12
Data collection and entry skills	12
GIS Skills	9
Plant Identification skill	8
Fish identification skills	8
Laboratory techniques	7
Community consultation skills	6
GPS skills	6
Other (all single occurrence)	5
Information seeking skills	4
Preparation of management plans skills	4
Problem-solving skills	3
Total	158

DISCUSSION

Identified Competencies

The results from the position descriptions and the evaluation surveys have been summarized into 10 different categories and are shown in Table 6 along with a skill rating. These reflect the applied nature of the Environmental Science course, with an emphasis on field based studies. These categories are similar to two of the three groups identified by Scholz, Steiner and Hansmann (2004), namely the scientific-based skills and the general abilities. One skill identified by Scholz et al. (2004) also identified in this study is that of scientific knowledge, with 39 occurrences.

The majority of the competencies have been rated as cognitive or “hard” skills as outlined by Rainsbury, Hodges, Burchell and Lay, (2002). The identification of predominantly “hard skills” is a reflection of the science discipline, where there is emphasis on “hard skills”. Hard skills were perceived to be more important than soft skills by science and technology stakeholders (Zegwaard, Coll & Hodges, 2004), however, stakeholders noted that soft skills were also perceived to be important by employers (Laslett & Zegwaard, 2004). The practical skills included under fieldwork include possession of a car or boat license, first aid certificate, made up 97 of the 179 fieldwork responses. These skills are not included in the curriculum and the students are encouraged to acquire these skills through enrollment in local adult education courses or through normal driver instruction programs.

Apart from the practical fieldwork skills, the other two main competencies identified were in communication and computing. Communication included both oral and written presentation skills, liaison with the public as well as other organizations, report writing and consultation, usually with the public. The combined computing skills included GIS, data handling, entry and analysis, and basic computing skills, usually word processing or familiarity with specific software.

TABLE 6
Summary of competencies identified from the position descriptions and the evaluation surveys

Competency	Frequency	Skill
Fieldwork – fish husbandry, tank maintenance, environmental surveys, practical skills	179	Hard
Communication – oral and written, liaison, report writing, consultation	155	Hard
Computing – GIS, data handling, data entry and analysis	124	Hard
Workplace – OH&S, office duties, appearance etc., language	84	Soft
Planning – planning, strategy development, time management	66	Hard
Knowledge – knowledge of legislation and regulation, ethics, funding	63	Soft
Increased subject knowledge and relevance to study	39	Hard
Laboratory – various laboratory skills	33	Hard
Social – teamwork, independent	32	Soft
Social survey – planning and undertaking	29	Soft
Education – develop and implementation	24	Hard

There was considerable demand for workplace skills, typically knowledge of Occupational health and safety (OH&S) rules, appearance, punctuality, phone, photocopy, and workplace language skills. These are not included in the Environmental Science curriculum and so are more readily acquired in the workplace (ranked 4th in Table 4). Social survey and planning skills are taught as part of some units of study within the curriculum.

Relevance to Southern Cross University Graduate Attributes

The Southern Cross University graduate attributes listed in the introduction tend to be very general, much like graduate attributes listed by many universities. They include a mixture of "hard" and "soft" skills. Table 7 has been constructed showing the University graduate attributes and where the relevant categories from Table 6 match these attributes, along with the skill type.

Not all competencies neatly fit the university attributes, and there is some overlap of categories with different attributes. None of the categories specifically demonstrate intellectual rigor, but several competencies contribute towards it. This highlights the difficulties of applying various competencies to a set of generic attributes. For example, computing skills can show command of an area of knowledge, and at the same time can be an effective communication skill.

Because of the difficulty in matching environmental science competencies to the University graduate attributes, School staff have decided to develop a process to embed graduate attributes within the School by using the following process. This process has already been used by three other schools within the University although the generic and discipline specific skills for these schools were obtained from student and employer surveys rather than co-op program feedback.

TABLE 7
SCU graduate attributes, and competencies and skills identified from position descriptions and the evaluation survey

Attribute	Competency	Skill
Intellectual rigor		Hard
Creativity	Education	Hard
Ethical understanding	Knowledge of legislation, etc.	Soft
Command of an area of knowledge	Fieldwork, computing, laboratory, social survey, planning	Hard
Lifelong learning	Knowledge of legislation etc	Soft
Effective communication and social skills	Communication, social, workplace, computing	Hard & Soft
Cultural awareness	Social, knowledge, workplace	Soft

Stage 1

This stage consists of the identification of generic and discipline specific skills by utilizing the information gained from the co-op program. These are the competencies gained from this research. However, because the competencies identified from position descriptions may only apply to new or recent graduates, and in some cases are specifically written for students enrolled in the Internship Study unit, they may not reflect the true skills needs for longer term employment. The competencies derived from the co-op program have been used in conjunction with the University graduate attributes to derive a set of graduate attributes for Environmental Science and Management students. These are as follows:

The Environmental Science and Management graduate will be able to demonstrate:

1. Intellectual rigor – Commitment to excellence in all scholarly and professional intellectual activities, including informed critical analysis, decision making and judgment as they relate to environmental science and management
2. Ethical approach – Understanding and commitment to the highest ethical and professional environmental standards, sensitivity to moral issues and conflicts, and relevant professional and environmental legislation and regulations
3. Creativity – Commitment to displaying enterprise, initiative, imagination, conceptual understanding, and creative responses to intellectual, professional, environmental and social challenges
4. Knowledge – Command of and confidence to work with relevant knowledge and skills within environmental science and management, to enable a smooth transition to professional or scholarly settings
5. Lifelong learning – Capacity to be responsive to change, reflective in practice, information literate, and capable of independent and self-directed learning to facilitate life long learning in others
6. Teamwork, communication and social skills – Ability to communicate and collaborate within environmental science and management contexts in ways that are appropriate in interpersonal, scholarly, professional and social terms, and
7. Cultural awareness – Awareness and respect for cultural diversity and the relationship between people and their environment, both regionally and globally.

The competencies identified from the co-op program are supplemented by information gained by surveying past students, employers and analysis of job advertisements. This stage is expected to be completed in January, 2007. From this, a matrix of skills and values will be drawn up to be used in Stage 2.

Stage 2

The assessment practices, and the learning and teaching framework will be matched against the matrix from Stage 1. This will be done in consultation with the unit assessors and will include clarification and redefinition of meanings and descriptors.

Stage 3

The graduate attributes will be rewritten probably as a sub-set of the University attributes, and will include the identified key competencies. This will also provide the opportunity for further research to compare graduate perceptions and experience against the School's attributes. This approach has been used successfully with a business course by Rainsbury, Hodges, Burchell and Lay, (2002), and by Coll, Zegwaard and Hodges (2002) with science and technology students.

Further evaluation and review will take place as needed.

CONCLUSIONS

This project has been useful in that it has provided a set of competencies which can then be used to develop specific graduate attributes for the School of Environmental Science and Management. Analysis of position descriptions and student evaluations can provide valuable information in establishing student competencies. Because they are drawn from the student's experience in the workplace they have considerable relevance to the study program as well as relevance to the workplace. This should help to make the students more employable.

By providing relevant competencies, this process will produce a set of graduate attributes that, hopefully, are more relevant than the University's generic set of attributes. A further positive outcome is that the competencies can be used to show industry that students from the School of Environmental Science and Management will be appropriately educated for their employment. This should also provide further benefits in marketing courses and attracting students.

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APPENDIX
SOY00222 Internship Study
Evaluation Survey

Please complete the following survey form and submit it with your diary

A General Questions

A1 When did you undertake your Internship Study?

A	After completing second year (16 units)	☐
B	After completing third year (24 units)	☐
C	After completing 16 units but not 24 units	☐

A2 What was the name of your Host organization?
A3 Who was your principal supervisor?
A4 What was their position?
A5 List the names and positions of any other supervisors
A6 What was the primary business of your host organization? (√ one box only)

Government department	☐
Research	☐
Council activities	☐
Providing commercial products or services	☐
Education	☐
Other (specify)	☐

A7 How many staff worked for your host organization? (√ one box only)

1-10	☐	11-50	☐	51-100	☐	>100	☐

A8 How many people were you working and interacting with on a daily basis? (√ one box)

1-2	☐	3-5	☐	6-10	☐	>10	☐

A9 What activity are you currently engaged in? (√ any that apply)

Continuing study for my Applied Science degree	☐
Continuing study for Honors or another degree	☐
Working for my host organization (Paid)	☐
Working for my host organization (Unpaid)	☐
Working in the environmental science area	☐
Working but not in the environmental science area	☐
Actively seeking work	☐
Not actively seeking work	☐

B Working Knowledge

Five areas of knowledge are important in the workplace. These are: theoretical knowledge, workplace language, workplace rules, workplace skills and techniques, and workplace relationships.
For the following questions, √ the response that most closely fits using the following scale:

1	2	3	4	5	6
Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Not Applicable

B1 Theoretical knowledge, e.g., scientific and technological information, background theory, etc.

	1	2	3	4	5	6
a. I learnt theoretical knowledge in my placement						
b. Theoretical knowledge learned in the placement helped me to do my work						
c. Theoretical knowledge learnt in the placement integrated well with what I had learned at uni						
d. Theoretical knowledge learnt in the placement helped me to feel more a part of the host organisation						

e. I learnt theoretical knowledge from (√ any that apply, double √ the source of most learning)

Attending group meetings		Reading company material	
Talking to my supervisor		Talking to my co-workers	
Reading relevant papers, etc.		Talking to university staff	

Other (specify)

B2 Workplace language, e.g., technical terms, abbreviations, etc.

	1	2	3	4	5	6
a. My workplace had some elements of language that were particular to it						
b. Learning the workplace language helped me do my job						
c. Knowing the workplace language helped me feel part of the host organization						
d. The workplace language should by included in the uni course						

e. I learnt workplace language from (√ any that apply. Double √ the source of most learning)

Attending group meetings		Reading company material	
Talking to my supervisor		Talking to my co-workers	
Reading relevant papers, etc.			

Other (specify)

B3 Workplace "rules" (the way things are done in your host organization)

	1	2	3	4	5	6
a. I learnt "rules" about working in science/technology in my placement						
b. These "rules" helped me to do my job						
c. Knowing the workplace "rules" helped me feel part of the host organization						

d. I learnt workplace "rules" from (√ any that apply. Double √ the source of most learning)

Attending group meetings		Reading company material	
Talking to my supervisor		Talking to my co-workers	
Observing interactions at work			

Other (specify)

B4 Workplace skills and techniques (e.g., Technical skills, communication skills, how to do tasks, etc.)

	1	2	3	4	5	6
a. I learnt skills and techniques in my placement						
b. These skills and techniques helped me to do my job						
c. These skills and techniques built on skills and techniques learnt at unit						
d. These skills and techniques should be included in the study program at uni						

e. I learnt workplace skills and techniques from (√ any that apply. Double √ the source of most learning)

Attending group meetings		Reading company material	
Talking to my supervisor		Talking to my co-workers	
Reading company material, etc.		I knew the skills from my studies	

Other (specify)

B5 Workplace relationships (e.g., Responsibility, lines of authority, who likes/dislikes who etc., how to get on with others)

	1	2	3	4	5	6
a. I learnt about the influence of workplace relationships in my placement						
b. Understanding these relationships helped me do my job						
c. Knowing these relationships helped me to feel part of the host organization						

d. I learnt workplace "rules" from (√ any that apply. Double √ the source of most learning)

Attending group meetings		Observing interactions at work	
Talking to my supervisor		Talking to my co-workers	

Other (specify)

C. Who helped you learn?

For the following questions, √ the response that most closely fits using the following scale:

1	2	3	4	5	6
Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Not Applicable

	1	2	3	4	5	6
C1 My host supervisor contributed to my learning						

C2 How did they help you to learn?
C3 What did they help you to learn about?

	1	2	3	4	5	6
C4 My co-workers contributed to my learning						

C5 How did they help you to learn?
C6 What did they help you to learn about?

	1	2	3	4	5	6
C7 The University Internship staff contributed to my learning						

C8 How did they help you to learn?
C9 What did they help you to learn about?

D. Learning in the Workplace

D1 What are the things you learnt in your placement?
D2 How did you learn those things?
D3 What were the skills you had learnt in your studies that you used in your placement? Relate them to the University units you have studied.
D4 What were the skills you learnt in the workplace that you did NOT learn in your studies?
D5 How do you think your experiences from the Internship Study have/will help you in the next stage of your career (e.g., Further studies, employment, confidence, experience, etc.)?
D6 Did you gain paid employment in a science related area as a result of the Internship Study?

Yes		No		More studies	

D7 Did you have any problems in your workplace experience? If so, identify them and describe how (if) they were overcome.
D8 Any final comments on any aspect of the Internship Study?

ABOUT THE JOURNAL

The Asia-Pacific Journal of Cooperative education (APJCE) arose from a desire to produce an international forum for discussion of cooperative education issues for practitioners in the Asia-Pacific region and is intended to provide a mechanism for the dissemination of research, best practice and innovation in work-integrated learning. The journal maintains close links to the biennial Asia-Pacific regional conferences conducted by the World Association for Cooperative Education. In recognition of international trends in information technology, APJCE is produced solely in electronic form. Published papers are available as PDF files from the website, and manuscript submission, reviewing and publication is electronically based.

Cooperative education in the journal is taken to be work-based learning in which the time spent in the workplace forms an integrated part of an academic program of study. Essentially, cooperative education is a partnership between education and work, in which enhancement of student learning is a key outcome. More specifically, cooperative education can be described as a strategy of applied learning which is a structured program, developed and supervised either by an educational institution in collaboration with an employer or industry grouping, or by an employer or industry grouping in collaboration with an educational institution. An essential feature is that relevant, productive work is conducted as an integral part of a student's regular program, and the final assessment contains a work-based component. Cooperative education programs are commonly highly structured and possess formal (academic and employer) supervision and assessment. The work is productive, in that the student undertakes meaningful work that has economic value or definable benefit to the employer. The work should have clear linkages with, or add to, the knowledge and skill base of the academic program.

INSTRUCTIONS FOR CONTRIBUTORS

The editorial board welcomes contributions from authors with an interest in cooperative education. Manuscripts should comprise reports of relevant research, or essays that discuss innovative programs, reviews of literature, or other matters of interest to researchers or practitioners. Manuscripts should be written in a formal, scholarly manner and avoid the use of sexist or other terminology that reinforces stereotypes. The excessive use of abbreviations and acronyms should be avoided. All manuscripts are reviewed by two members of the editorial board. APJCE is produced in web-only form and published articles are available as PDF files accessible from the website http://www.apjce.org.

Research reports should contain; an introduction that describes relevant literature and sets the context of the inquiry, a description and justification for the methodology employed, a description of the research findings-tabulated as appropriate, a discussion of the importance of the findings including their significance for practitioners, and a conclusion preferably incorporating suggestions for further research. Essays should contain a clear statement of the topic or issue under discussion, reference to, and discussion of, relevant literature, and a discussion of the importance of the topic for other researchers and practitioners. The final manuscript for both research reports and essay articles should include an abstract (word limit 300 words), and a list of keywords, one of which should be the national context for the study.

Manuscripts and cover sheets (available from the website) should be forwarded electronically to the Editor-in-Chief directly from the website. In order to ensure integrity of the review process authors' names should not appear on manuscripts. Manuscripts should include pagination, be double-spaced with ample margins in times new-roman 12-point font and follow the style of the Publication Manual of the American Psychological Association in citations, referencing, tables and figures (see also, http://www.apa.org/journals/faq.html). The intended location of figures and diagrams, provided separately as high-quality files (e.g., JPG, TIFF or PICT), should be indicated in the manuscript. Figure and table captions, listed on a separate page at the end of the document, should be clear and concise and be understood without reference to the text.

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