Research Report

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Environmental Science Cooperative Education: Benefits for the Student, the Host Organization, and the Study Program

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This paper describes the positive outcomes of a preliminary evaluation of a cooperative education program for environmental science students at Southern Cross University. The benefits for the student include increased employment opportunities, contacts with potential employers, knowledge of employers requirements, and the development of job application and interview experience. The host organization benefits by having eight weeks of student participation in projects and tasks, as well as access to the University staff and facilities. The study program benefits from widespread acceptance in the workplace as well as gaining feedback into the development of skills and knowledge into the curriculum. (*Asia-Pacific Journal of Cooperative Education, 2005, 6(2), 1-6)*.

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The history of cooperative education programs has been reported extensively in the literature including a review of historical aspects by Linn (2005). Laslett and Zegwaard (2004) examined the history and development of cooperative education in science and technology, and identified and described a number of programs. Sovilla and Varty (2004) in their review of American cooperative education programs, pointed out the growth of these programs within universities and colleges in the last three decades. This growth has come about through Federal funding changes and the increasing numbers of co-op practitioners as well as acceptance by professional bodies. The growth has also probably arisen from the important economic, technological and social changes over this period. These changes have been associated with the rapidly globalization of the economy (Chappell, 2003) and have not only altered the skills required by employers, but also necessitated change within educational organizations to ensure that their graduates have those skills to make them more employable (Department of Employment & Workplace Relations [DEWAR], 2004). These changes have also led to the proliferation of vocationalism within various sectors of the Australian education system (Chappell, 2003).

The benefits of cooperative education programs to students, host organizations and the academic institution have been well documented in the literature. Coll and Eames (2000) summarized several sources and listed benefits such as financial reward, career enhancement, cost savings, and collaboration between the employers and the academic institution. Wilson (1989) cited in Dressler and Keeling (2004) 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. Edwards, Jancaukas and Goldston (1999) compared co-op and non-co-op engineering students and found that co-op students had higher pay rates, gained employment quicker and had higher job satisfaction. However, non-co-op students had greater levels of responsibility, although no reasons were offered for this. 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. Dressler and Keeling (2004) examined student benefits and commented that much of the research was often anecdotal. They tabulated a number of studies and classified the major student benefits into academic, personal, career, and work skills development, but stressed the need for greater measurement of student learning outcomes.

Employer benefits of cooperative education 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). In an earlier study, Braunstein and Stull (2001) described additional benefits including the hiring of people

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with special skills, bringing new knowledge into the organization, fulfilling social responsibilities and providing supervisory experience. Employers have also reported cost benefit advantages as a result of co-op participation (Chapman, Coll & Meech, 1999).

The 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, whilst Calway and Murphy (1999) found there was potential benefits for curriculum development and marketing of study programs.

This paper describes the establishment of a cooperative education program within the School of Environmental Science and Management at Southern Cross University, Lismore New South Wales, Australia, and attempts to identify the beneficial outcomes from this program for the students, the employers and for the academic institution through a preliminary evaluation.

Background

The Program

The School of Environmental Science and Management offers a Bachelor of Applied Science degree with major strands in Coastal Management, Environmental Resource Management, and Fisheries and Aquaculture Management. In 1997 the decision was made to establish a cooperative education program, titled Internship Study. The decision arose jointly out of student requests, and from staff who also perceived the need for such a program.

The objectives of the Internship Study are such that on completion students will be expected to have:

1. Demonstrated a knowledge and understanding of the requirements of employment and workplace practices
2. Gained practical experience in developing and applying interpersonal and technical skills necessary in their chosen field of endeavor
3. Demonstrated a willingness and capacity to undertake and assess various duties required during their internship
4. Applied theoretical knowledge from their university studies to practical workplace concerns
5. Established skills in seeking employment and industry contacts which will help facilitate the student's entry into full-time, paid employment on completion of their degree, and
6. Demonstrated an ability to critically assess and report on their workplace experience.

Four academic staff members established the unit and undertook the task of finding organizations that would be willing to act as hosts for students. These organizations were asked to provide a placement description, but were given considerable flexibility in deciding what tasks were required of the students. Initially the Internship Study required students to complete a written application, undertake an interview for their chosen placement, complete 10 weeks of equivalent full time work experience, keep a work diary, and present a report on their experience. The supervisor within the host organization was also asked to submit a written evaluation of the student and the Internship Study itself. Students completing the Internship Study receive course credit for one elective unit in a program of 24 units. The work experience is usually undertaken during the summer break (November to February). Placements were generally unpaid, and participation in the Internship Study is not compulsory.

The Internship Study is only available to students who have completed two years of study (16/24 units). The 10 week period was chosen because it was felt that the host organization would get more benefit from a longer period of time with the students, and allow the student to complete a specific project or series of tasks within the host organization. Examples of host organizations include Federal and State government departments (e.g., Department of Land and Water Conservation, National Parks and Wildlife Services, Fisheries, etc.); local government (various city and shire councils); non-government organizations (Coast Care, Australian Wetlands Conservation); and private companies (consultants, fish farm companies, etc.). These are referred to as 'School-based Placements'.

After two years, and in response to student feedback, the time period was reduced to eight weeks or equivalent (approximately 280 hours). The students who had completed the Internship Study reported that the 10-week period did not allow them time during the summer break to also undertake paid work to supplement their income. It was felt that the reduction to eight weeks would still provide sufficient time for the host organization to get benefit, the 280 hours was closer to the expected study time for a full-time unit of internal study (250 hours), and it would allow the students up to an additional eight weeks to find paid work.

The Internship Study was usually undertaken during the long summer break (November to February). If necessary, flexible arrangements could be made whereby the student could complete the work requirements on a part-time basis, and also at different times in the year. Flexibility was usually required if the student had family or other commitments that precluded them from doing the 8 weeks in one block.

The co-op program has a supervisor - one academic staff member (the author) who is the unit assessor and responsible for the academic aspect of the program. Co-op supervision makes up approximately 30% of staff members workload. There is one half-time administrative assistant who is responsible for record keeping, contact with students, host organizations and general communication. Workplace supervision of all students is undertaken by the host organizations and is delegated to a named person, usually the student's direct supervisor. All students and supervisors are contacted at least once during the period of the Internship Study by co-op staff, and students are encouraged to contact the co-op staff if they need assistance.

Another modification to the program in 2000 enabled students to find their own placements. Students undertaking this option were not required to submit an application or attend an interview, but they had to submit a copy of their curriculum vitae. These placements are usually referred to as 'own arranged placements'.

Anecdotal evidence suggested the program was valuable. Several students had gained employment and comments made by host organizations had been perceived as favorable. However, because there has been no formal evaluation of the program, the academic supervisor of the program (the author) instigated the undertaking of a preliminary evaluation of student reports and host evaluations for the two internship periods of 2002/2003 and 2003/2004. The preliminary evaluation was undertaken with the following objectives:

1. To identify the perceived benefits of the co-op program for students, the host organizations and the academic institution
2. To identify the perceived strengths and weaknesses of the program, and
3. To gain information to establish a more rigorous evaluation of the program.

This paper presents the findings of the preliminary evaluation.

Methodology

Student reports and host evaluations were examined from the internship periods of 2002/2003, when 45 students were enrolled, and 2003/2004, when 93 students were enrolled. The student reports included descriptions of the agency they worked for, a project description and a personal evaluation which included:

- An analysis of the links perceived between the work placement experience and their degree course
- A critical evaluation of their achievements, for example, what was learned and the skills and knowledge acquired
- Comments on the relevance of their degree studies in relation to the organization in which they worked
- Identification of skills and knowledge obtained during the Internship Study, which are not currently taught, but which could be included in the Bachelor of Applied Science course
- Identification and discussion of any problems which emerged during the placement, and
- An analysis of the cooperative education program and how valuable the experience was.

The 138 student reports were read and comments about beneficial aspects of the co-op were tabulated by subject matter or similar phrasing. While recognizing there are potential problems using this qualitative method of content analysis (Linn, 2005), this was the only appropriate method available as the evaluation of the co-op program was only preliminary. 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). As many of the Internship Study students had completed their studies and left the university, other methods of evaluation, such as personal contact or mailed surveys, were not considered.

The student's supervisors in the host organization completed an evaluation form in which they were asked to rank the student's ability in key areas as well as to make personal comments on aspects of the program. These key areas were identified by the academic staff who established the Internship Study and included planning, initiative, time management, relationships with staff and/or clients, competence, and professional attitude. All of the academic staff members had extensive experience in the workplace prior to becoming academic staff at the university. A qualitative approach was used in evaluating the supervisor's comments by tabulating, supplemented with a quantitative analysis of the supervisors ranking of the student's abilities in the key areas.

Research Findings

Benefits for the Students

Table 1 summarizes the perceived benefits identified in student reports. In addition to these benefits, further observations were made including the recommendation by 26% of students that the Internship Study should be made a core (compulsory) unit for all students (the degree program includes core units and elective units). Of perhaps greater significance, 22% of students gained further paid employment as a direct result of their internship. Because the internship is available to students who have completed 2 of the 3 years of the study program, not all students who participate in the program are available to immediately commence employment following their internship. More final year students are now undertaking the internship as their final unit of study. As a direct result of this, enrollments in the unit increased from 45 in 2002/2003 to 93 in 2003/2004, an increase of 100% in participation.

These benefits are strongly related to the unit objectives outlined earlier and those benefits mentioned in the literature. The students reported they are using and enhancing their skills as they increase their knowledge of workplace requirements. Students viewed the variety of tasks and duties they undertake, allied with studies, will increase their employability and improve their application and interview skills. The lower rating of developed job application skills (18%) and interview skills (21%) are possibly a reflection of the time when the report was written, usually 3 to 4 months after the application and interview process. Also, students who find their own placements do not usually complete applications or attend interviews. The two benefits that were identified by the most students in Table 1 could be classified as cognitive or 'hard' skills using the concept of hard skills versus soft skills 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

TABLE 1
Summary of perceived benefits of Southern Cross University environmental science students (N=138)

Benefits	Rating (%)
Research and/or practical skills were enhanced	74
Used skills learned or acquired from study	67
Gained insight into professional work	59
Improved development of career path	33
Improved liaison with the public	33
Improved communication skills	30
Improved personal confidence	26
Gained a broad range of experiences	22
Gained experience in being interviewed	21
Made valuable contacts	19
Had excellent support from host organization	19
Developed job application writing skills	18
Identified the need for further study	15
Able to expand their experience into further study	11

TABLE 2
Rating of student's performance by the host organization supervisor (excludes 'not applicable' responses)

Attribute	Mean	Number	SD
Pre-internship planning	1.9	72	0.8
Knowledge of the agency	2.0	72	0.7
Initiative	1.4	79	0.7
Time management	1.6	79	0.7
Relationship with staff	1.2	78	0.5
Relationship with clients	1.3	67	0.6
Administrative competence	1.6	70	0.7
Professional attitude	1.4	77	0.7
Overall performance	1.3	79	0.6

skills'. Most benefits listed could be categorized as cognitive or 'soft skills'. Hard skills were perceived to be more important than soft skills by science and technology stakeholders (Zegwaard, Coll & Hodges, 2005), however, stakeholders noted that soft skills were also perceived to be important.The only negative aspect of the co-op program reported by 10% of the students was the unavailability of paid placements. Almost all placements are unpaid although some host organizations provide assistance with travel and accommodation costs. Attempts have been made to obtain more paid placements as this is possibly a reason why students do not undertake the Internship Study.

A more rigorous evaluation has to be carried out in order to ensure the benefits are considered in the context of the stated objectives, the design of systematic learning experiences, and the extent to which the objectives are being achieved (Dressler & Keeling, 2004). However, the preliminary evaluation suggests that the current co-op program is meeting its objectives and providing benefits for the students.

Benefits for the Host Organization

Table 2 summarizes the responses by the host organization supervisors for each of the key areas. Ratings were on a 4-point Likert scale with 1 being 'excellent', 2 being 'good', 3 being 'satisfactory', 4 being 'unsatisfactory'. Only 79 supervisors reports were available as sometimes supervisors are tardy in returning forms or the supervisor has left the organization.

The lower satisfaction rating (mean = 1.9) for the pre-internship planning may be partly reflective of students who have chosen to find their own placement. School based placements have usually been as a result of on-going participation in the program and planning problems have been resolved. When a student organizes his or her own placement it may have been with a host organization with little experience of co-op programs.

The lower satisfaction rating (mean= 2.0) for the student's knowledge of the agency is of concern and steps have been taken to place more emphasis on this aspect in the application and interview components of the program. All students applying for a school based placement are expected to answer questions about the organization they wish to join. Students who organize their own placement are encouraged to gain detailed knowledge of their host organization, but because they are not interviewed by co-op program staff it is difficult to determine if the students have gained the knowledge.

The low mean values for a number of attributes are pleasing and reflects well on the students and the co-op program. Generally, students involved with the co-op program are motivated students and this is reflected in the student's quality of work and performance.

The host organizations were given the opportunity to make suggestions on how to improve the program. They provided a diverse range of comments about the program. Generally, they praised the program and the participants. Examples of the benefits mentioned included the screening of potential employees, completing projects that would have otherwise lapsed, reducing costs of employment and training, and providing positive links with the university. These are similar to some of the benefits identified by Braunstein and Stull (2001). In several cases the host organization stated that they wished to continue their involvement with the co-op program, and in some instances stated they would like to expand their involvement.

Benefits for the Study Program

In their evaluations, students were asked to identify key skills and material which they used as part of the Internship Study which were not included in their degree study program. One computing software package (Microsoft Access™) was identified. As a result the computing units have been altered to incorporate this software. Students within the Fisheries and Aquaculture strand of the degree identified the need for boat license and boat handling skills, and this has now been included in the study program. Another addition to the program has been the inclusion of more formalized client/customer public relation skills.

The links between the university and industry have been strengthened by the student placements in the workplace, visits, and other university contact. During the six years of the program, a staff member has visited many of the host organizations. Visits to all host organizations are not possible because of the student-arranged placements, and because some placements are located interstate and/or overseas.

Other benefits have also been recognized. The Fisheries Department in North Queensland, within the Queensland Government Department of Primary Industries, commented that the Southern Cross University students undertaking internships had up-to-date knowledge of fishery techniques, and as a result they will not be taking on students from another institution. Because Southern Cross University is a relatively small and new institution, it has been difficult for graduates to gain recognition over graduates from older and larger institutions. The Internship Study has helped to overcome this problem. As a consequence both of these benefits have improved the employment options for Southern Cross University graduates. Further research will be carried out to ascertain the improved employability of the graduates after they have completed the co-op program at Southern Cross University.

As the program has been running for 6 years we are now being approached by graduates, who are now sufficiently advanced in their careers, offering Internship Study places within their organizations. Because of the perceived success of the program it is now used in the School's advertising campaigns, a common benefit identified by (Weisz, 2005).

Conclusions

The co-op program is achieving its learning objectives and is delivering measurable benefits to all stakeholders involved. The key attributes of the program are its flexibility, the length of time the students spend with the host organizations, and the communication between all stakeholders. The major benefits for the students are enhanced employment opportunities, improved job application skills, and an appreciation of how their university program equips them for employment. The host organizations benefit from the opportunity to recruit staff, completion of tasks, and access to university facilities and staff. The university benefits from upgrading of program content, recognition in the workplace and favorable publicity.

The preliminary evaluation has identified the need for a more formal evaluation process to be established with enhanced opportunities for evaluation of the program. Key aspects for further research are the identification and value of the learning outcomes, a more rigorous student and host evaluation system, long term monitoring of student outcomes such as employability, starting salaries etc. An evaluation of the relationships between student grade point average, academic record and performance in the co-op program will also be undertaken.

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