Section I

1. Project Leaders / Collaborators
   Dr. Ian Williams & Dr. Roberta Bencini, School of Animal Biology, Faculty of Natural and Agricultural Sciences.

2. Project title.
   Developing and implementing outcome based learning in Ecosystem Processes 100

3. Funds allocated and detail of expenditures against budgeted figures.
   $15000. The funds were spent to employ a 0.3 Associate Lecturer for 14 months.

4. Status of report (interim or final)
   Final.

Section II

1. Taking in turn each objective of the original application and each objective of the scheme to what extent has the project succeeded?

The general aims of the project were:

- To introduce outcome based and group learning approaches into Ecosystem Processes 100.
- To enhance students’ learning and encourage students to take responsibility for their own learning by using group-based activities in the first year of their course.
- To encourage staff to become involved in group-based learning activities as a way of teaching.
- To train staff to manage students in group-based learning.
- To train students in the essential criteria that most employers currently seek, namely, the ability to work in a team and the ability to communicate.

These were fully accomplished with the establishment of learning outcomes for the unit and related assessment methods and with the introduction of formal lectures in team learning skills and team management skills.

The overarching learning outcomes for the unit were developed in a series of workshops with the staff involved. We agreed that after taking the unit students should be able to:

- Identify, access and critically evaluate information from a range of resources including library, web, professionals and experimental work.
- Express ideas coherently and logically when working both independently and collaboratively (in teams) through assignments and in practical sessions.
- Critically appraise the strengths and weaknesses in their knowledge both independently and as a group, and propose solutions to overcome these weaknesses.
- Demonstrate their comprehension of the scientific method by setting and testing hypotheses.
• Communicate their comprehension of the scientific and economic background to contemporary issues in agriculture, horticulture, landscape management and natural resource management.

• Demonstrate the use of mathematical, biological, chemical and economic principles in solving problems related to ecosystem processes.

Assessment methods varied between different modules but most modules involved assessment of group work (e.g. oral presentations organised by teams of students) as well as work produced by individual students (e.g. scientific reports).

Group learning was implemented after Dr Allan Goody (Centre for Staff Development) delivered formal lectures in team learning skills and team management skills initially to the staff involved in the unit, and later to students enrolled in the unit. We also organised a series of workshops from Jenny Donovan (Curriculum Council of WA) and Sally Reagan (PBL Curriculum Consultant, Medicine) to learn more about group learning.

2. Has the project been completed as described in the application? Please identify any changes in your appreciation of the issues or circumstances involving the project.

Yes, the project has been completed as described in the original application.

3. In particular, has the planned innovation been put in place?

Definitely. See above.

4. What measures have been used to evaluate outcomes? Please summarise the data you have obtained.

We appointed a part time associate lecturer, Dianne Arnott, who acquired experience in these teaching techniques and trained both staff and students involved, managed the teams of students for a whole semester and met regularly with teams, particularly those that identified problems in their team work dynamics. She also conducted a comprehensive evaluation of the unit.

5. What impact has the project had on students' learning? How have student learning outcomes been evaluated?

Dianne Arnott conducted frequent evaluations of the unit, including students’ perceptions of the group work, SPOT assessments and ad hoc surveys. Her final report to the Faculty is attached (Appendix I).

6. In what ways is it clear that the outcomes of the project will achieve on-going integration into the curriculum, teaching programme and/or pedagogy of the school, discipline(s), course, etc.?

Our innovation is now an integral part of the units Ecosystems Processes 101 and 102 (Ecosystems Processes 100 was a 12 point unit and we had to split it into two separate 6 point units). Faculty staff are very committed to continuing the team work and outcome based approach.

7. Are there any implications for the structure (regulations etc.) of degree courses?

Not really but we are frustrated that a very good unit had to be split into two smaller units running the risk of loosing continuity and cohesiveness in the programme.

8. Have the outcomes justified the cost as measured by grant costs and staff time?

To say it in simple words, we believe this is the best money ever to be spent, at least for the benefit of the students. Without a doubt staff involved have to work much harder to conduct this type of teaching. However, we believe that it is a more satisfying method of
teaching and hope that our colleagues are not too upset with us for the extra work they have to do.

9. Do you have any recommendations regarding future teaching and learning initiatives or their funding?

Continue to fund innovations in teaching but perhaps also give recognition to those that are committed to teaching thorough small prizes that could be nominated by staff as well as students.
Appendix 1 - Evaluation of Ecosystem Processes 100, 2002

(By Diane Arnott)

This year several major changes were implemented in EP100. We applied a set of outcomes to the course, and changed several of the modules to incorporate a large group-based learning component. The students were surveyed several times with the following objectives:

- Determine their response to group work
- Determine whether or not they felt they had met the outcomes of the unit
- Two modules were SPOT tested independently

Response to Group Work

At the beginning of the unit we put a considerable effort in to teaching the students how to work in groups, with Allan Goody of the Centre for Staff Development. The students were asked if they felt that these sessions were beneficial. Twenty-four students had received some group training before, while 20 had not. Five students found the sessions very helpful; 36 found them somewhat helpful, and another five found group training to be not helpful.

In module one, 17 groups handed in reports. Groups could determine how they wanted their marks allocated; they could split them evenly, or if one person did less work than the others, that person could earn less of the total while the other members were rewarded with extra marks. Each group handed in a signed group work marks allocation form, and each individual handed in a confidential form stating whether or not they agreed with the group marks allocation. Fifteen of the groups shared the marks equally, while two did not. Only one student (from a group that did not split the marks evenly) indicated that he was not happy with the group marks allocation. Even though he got a higher percentage of the marks than the others in his group, he felt that he should have earned even more for his efforts.

At the end of the unit we surveyed the students again about their experience with group work. This survey was given during module six and received 63 responses. When asked how their perception of group work had changed over the year, 60% indicated that their perception of group work had improved, while eight percent stated that their perception of group work had declined. Seventy-four percent indicated that they had enjoyed the group work components of the modules, while 14% did not.

Reasons given for liking group work (these reasons were given as choices on the survey form and students could tick more than one) were:

- I got to meet new people- 35 responses
- I didn’t have to do as much work because each person had an assigned job- 28 responses
- I learned more because I heard the views of others on the section(s) that I was doing- 36 responses
- The group marks allocation meant that I received an appropriate amount of marks for the effort I put in- 10 responses

Reasons given for disliking group work:

- I had to work harder because of slack group members- 5 responses
- I didn’t get along with my group members- 2 responses
- I did not learn as much because I only worked on one section of the assignment(s)- 7 responses
- Despite the group marks allocation system, I did not receive an appropriate amount of marks for the effort I put in- 2 responses

Did Students Meet the Unit Outcomes?
This survey was given during the last lecture of EP100 by Ian Williams. Due to the low attendance (32 surveys returned), Ian asked the students to put their names on the survey forms. This may have caused students to be more cautious about criticising the unit, resulting in an artificial inflation of the scores. In addition, the students who attended the final lecture earned an average 67.7% for the unit; those who did not earned 58.8%. It is therefore fair to say that the responses received were from the students who put in an effort and are therefore more likely to feel that they met the outcomes.

Students were asked to rate whether they agreed with a series of statements, on a scale of one to five (1- strongly disagree; 5- strongly agree). The questions and mean responses are below:

**Compared to the beginning of EP100, I can now better:**
- Appraise strengths and weaknesses in my knowledge- 3.59
- Propose solutions to overcome weaknesses in my knowledge- 3.53
- Critically evaluate information from a range of resources- 4.13
- Express ideas coherently and logically in assignments- 3.8
- Express ideas coherently and logically in practical research- 3.56
- Use related principles in solving problems related to ecosystem processes- 3.81
- Relate scientific information to contemporary issues in my area of study- 4.06

Overall, the students seem to feel that they met the outcomes of the unit, although there are a few (“Propose solutions to overcome weaknesses in my knowledge- 3.53” and “Express ideas coherently and logically in practical research- 3.56”) on which we should work to improve.

We also asked students if they preferred the format of EP100 to that of other first-year units; the mean response was 3.91 on a scale of 1 to 5. When asked if they feel that they have a rapport with members of the teaching staff of EP100, the mean response was 3.53. It is gratifying to see that the students like the format of EP100 (although one indicated that she liked the lack of exams!), but considering the time and effort put in to the teaching of the module by so many Faculty staff, I would expect the students to indicate that they felt a stronger rapport with us.

**Individual SPOT Test Results**

**Module 1- Scientific Investigation**

Some highlights:
- 50% feel that they have improved their ability to express ideas in writing; 12% disagree
- 78% feel that they have improved their research skills; 6% disagree
- 72% feel that they have been encouraged to participate actively in class discussion; 6% disagree
- 73% feel that the module helped them to develop their abilities to work as team members; 9% disagree
- 37% feel that working in groups is preferable to working individually; 32% were neutral; 31% preferred working individually
- 65% felt that their group worked well together; 7% did not

Written comments indicated that the students enjoyed the group work, but wanted more sessions or time for learning how to write reports. Some suggested that they get to see model reports, which is one aspect of the University-wide change to outcomes-based education. The students also felt that they had to wait entirely too long to get feedback on their reports, which is a legitimate complaint. They also felt that it was unfair that their tutor did not mark their report; although this was done to ensure consistency in the marking, we (as tutors) should communicate better about what the person marking the reports will be looking for!

**Module 4- Nutrient Cycling in Soils**
As a tutor in this module, I know that the major assignment caused the students significant stress, which is not necessarily a bad thing as they were forced to extend beyond their comfort zones and many succeeded in so doing. However, the SPOT results indicate that the students did not enjoy this module. A few results that stand out:

- Class sessions have been well-organised- mean of 3.23
- Clear and understandable explanations have been given- 3.22
- Material has been presented in an interesting way- 3.08
- The material covered has helped me to tackle the assigned tasks effectively- 2.81
- The tutorials in this module were useful in helping me to learn- 2.97

**Summary**

Overall it seems that the student reaction to the changes to EP100 was positive. We will be conducting a focus group (run by Krystyna Haq, Science Skills Coordinator in Student Services) early next year so that we can get a clearer idea of student response.