

FACULTY OF SCIENCE

**ACADEMIC BOARD VISIT TO REVIEW
TEACHING, LEARNING AND
RESEARCH TRAINING**

TUESDAY 11 JUNE 2002

**FINAL REPORT AND
RECOMMENDATIONS**

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INTRODUCTION

An Academic Board Review Team visited the Faculty of Science on Tuesday 11 June 2002 as part of the review and evaluation of teaching, learning and research training within the Faculty.

During the visit, interviews were held with the following groups:

- The Dean, Professor Beryl Hesketh and Associate Deans
- The Dean and Heads of Department
- Undergraduate students
- Postgraduate coursework students
- Postgraduate research students
- Faculty academic and general staff
- Individual staff members invited to an open session

Membership of the Review Team

Professor Judyth Sachs	<i>Chair, Academic Board (Chair)</i>
Ass Prof Brad Buckley	<i>Sydney College of the Arts</i>
Dr Elizabeth Ellis	<i>Faculty of Health Sciences</i>
Ass Prof Peter McCallum	<i>Deputy Chair, Academic Board</i>
Professor Paul Ramsden	<i>Pro-Vice-Chancellor (Teaching and Learning)</i>
<i>with</i>	
Elizabeth Hanna	<i>Executive Officer (Quality Assurance)</i>

Findings of the Review Team

The Review Team interviews focused on eight main areas

- Graduate attributes, aims and outcomes;
- Assessment
- Research-led teaching;
- Teaching and Learning Quality
- Evaluation and Quality Improvement
- Student Progression
- Research Supervision and Training
- Combined degrees

This report provides a record of the discussions and the main findings of the Review Team. The *Areas of good practice* and *Areas for consideration for improvement* identified by the Panel are provided at the start of the Report in s. 1 Conclusions. The conclusions are cross-referenced with the full text of the report.

It is worth noting that the Review Team received varied feedback on many issues, particularly in its meetings with students, which were only a small sample of the student body. The Report attempts to reflect this degree of variation, which came as no surprise in such a large and diverse Faculty.

1. CONCLUSIONS

1.1 *AREAS OF GOOD PRACTICE*

General

- 1.1.1 The Review Team appreciated the open and constructive way in which the Faculty approached the Review process and the challenges it currently faces. The Team formed a view of a large and diverse yet cohesive Faculty where staff worked hard to provide a supportive learning environment for students through enthusiasm and professionalism. Staff in the Faculty appeared to be working to minimise the effects on the student experience of large student numbers coupled with staff shortages and a significant turnover of staff in recent years. The Review Team commended the strong leadership of the Dean (which had been praised by the staff) and the collegiality of the Faculty.
- 1.1.2 Certain areas stood out during the course of the Review as performing particularly well: the Review Team commended the Schools of Chemistry and Physics on their high levels of achievement in teaching and research training. The School of Chemistry has increased applications and enrolments contrary to trends within equivalent schools in other Australian universities.
- 1.1.3 The Team considered that the Faculty's committee structure and lines of communication were exemplary, particularly given the size and complexity of the Faculty. Mechanisms for dissemination of Faculty and University policies and guidelines worked well, with consequent high levels of awareness and understanding across the teaching staff. In particular, the Faculty and School Teaching and Learning committees worked effectively in disseminating information and stimulating ideas and debate.

Graduate attributes, aims and outcomes

- 1.1.4 The Review Team welcomed the Faculty's commitment to the development and integration of graduate competencies and skills and was supportive of the initiatives currently in hand to foster improvement. It recommended that the Faculty take note of the comments from students outlined in this report with a view to achieving greater consistency of practice across the Faculty. (see s. 2)

Research-led Teaching

- 1.1.5 The Faculty has been successful in integrating teaching and research in some areas, particularly from undergraduate Senior level and above (although student feedback suggested significant variation of practice across the Faculty). The Panel commended the high level of integration in some areas, whilst recommending that the Faculty seek to extend this good practice more consistently across the Faculty. The widespread involvement of staff in research, and the Faculty's strong research record, are great strengths. (see s. 4)

Teaching and Learning Quality

- 1.1.6 The Faculty's recent raising of the profile of excellence in teaching and its commitment to developing innovation is to be commended, as is the high number of teaching awards achieved by Faculty staff. (see s. 5)

Evaluation and Quality Improvement

- 1.1.7 The Team welcomed the Faculty's rolling program of Departmental and Program reviews, particularly the involvement of external academics and practitioners. (see s. 6)

Student Progression

- 1.1.8 The recent increase in the Faculty's UAI from 72 to 81 was considered by the Review Team to be a notable achievement. Outreach programs to high schools run by some of the Faculty's schools were considered to be an example of good practice which may have contributed to the UAI increase. (see s. 7)
- 1.1.9 The Faculty is to be commended for the highly effective Transitional Workshops and Parents' Program. The Review Team considered this to be an example of good practice that could usefully be implemented elsewhere in the University. (see s. 7)

Research Supervision and Training

- 1.1.10 The high quality of research training provided to students is to be commended. It was noted that the quality of the research training is reflective of the Faculty's strong research record. (see s. 8)

1.2 *AREAS FOR CONSIDERATION FOR IMPROVEMENT*

Graduate attributes, aims and outcomes

- 1.2.1 Faculty should explore ways to provide stronger professional links, for example in work-based learning, and, ways to ensure that applicants and students have realistic expectations of the balance the Faculty achieves between a discipline and professional orientation. (s. 2)

Assessment

- 1.2.2 The Review Team formed the view that the effectiveness of the management and assessment of group work was inconsistent across the Faculty. It worked well in some areas and not in others. The Faculty might benefit from undertaking a review of this issue and developing strategies for staff development and monitoring of standards to ensure that group work is appropriately designed and supported. A Faculty-wide policy and guidelines that would also be made available to students would be beneficial. This review should take account of student feedback, both through the Faculty's committee structure and student questionnaires. Care should be taken to ensure that there is a correct balance in terms of the amount of group work a student will participate in within their degree course, and that the assessment is aligned to objectives planned to develop the various transferable skills associated with team work. (see s. 3)
- 1.2.3 It is recommended that Faculty should endeavour to achieve greater consistency in the provision of full and timely feedback on assessed work, particularly for first and second year students. The Faculty may also wish to consider expanding its Strategic and Operational Plans for Teaching and Learning to include more focus on assessment, particularly in relation to the development and assessment of graduate attributes. (see s. 3)
- 1.2.4 The Faculty is encouraged to consider ways to increase the variety of modes of assessment. (see s. 3)

Research-led Teaching

- 1.2.5 The Team recommended that the Faculty should consider ways to expand the good practice identified in some discipline areas in relation to research led teaching to benefit students in all areas, paying particular attention to first and second year students. (see s. 4)

Teaching and Learning Quality

- 1.2.6 It is recommended that the Faculty make it a priority to consider ways to provide and improve training for sessional and part-time tutors and to monitor consistency of compliance. The Faculty should aim to achieve greater consistency and monitoring of the standards of tutor performance (see s. 5).

Evaluation and Quality Improvement

- 1.2.7 More formalised mechanisms for collating, analysing, disseminating and responding to student feedback (from CEQs, SCEQs, Faculty questionnaires and staff/student consultative committees) should be developed. This should include mechanisms for advising students of changes resulting from their feedback. (see s. 6)
- 1.2.8 The Review Team commended the Faculty on its operation of staff/student consultative committees, but recommended that meetings should be held at least twice per year and that meetings should be strategically timed to facilitate student attendance and the possibility of timely change in response to feedback. (see s. 6)
- 1.2.9 The Panel did not form a comprehensive view of the level of student input to Faculty committees, but, noting some indications of lack of student involvement, suggested that the Faculty might wish to review this issue. (see s. 6.2)

Student Progression

- 1.2.10 Notwithstanding the Faculty's good performance in raising its UAI and forming links with high schools, the Review Team encouraged the Faculty to review its admission policy, and its practices for identifying and rectifying weaknesses of entrants, such as requiring certain students to take mandatory bridging courses. (see s. 7)

Research Supervision and Training

- 1.2.11 It is recommended that Faculty should consider ways to achieve greater consistency in terms of the quality of support for postgraduate students (coursework and research) and also its fitness for purpose. Faculty is asked to note and address the view expressed to the Review Team by some students that there is not equity in the distribution of funds for conferences. (see s. 8)

Combined degrees

- 1.2.12 The Faculty should investigate how it can improve management of Combined degrees, including how to improve communications with students enrolled on these degrees, and, communications with the collaborating faculties. (see s. 9)

2. GRADUATE ATTRIBUTES, AIMS AND OUTCOMES

- 2.1. The Faculty Standing Committee, Teaching and Learning Committee and Undergraduate Studies Committee all contribute to ensuring coherence between aims and outcomes of units of study and programs. All new units of study are thoroughly vetted by the Faculty Undergraduate Studies Committee. However, it was noted by Faculty staff that, as units of study contribute to degrees across the Faculty, it often made more sense to make direct links between units of study and Majors, rather than units of study and degrees.
- 2.2 Degree Reviews, Departmental Reviews and Program Committees all address the relationship between generic and disciplinary skills. In December 2001 the Dean proposed an enhancement program that aimed to: develop students' awareness of the significance of skills as part of their education and subsequent career; provide opportunities to develop and practice such skills through tailored self-help programs or within the curriculum; and provide opportunities to demonstrate improvement and competence in such skills as part of the degree assessment and feedback process. Seven key skill areas were identified as follows: problem solving; communication; numeracy; information literacy; critical thinking; group and team skills; learning and self management.
- 2.3 A trial Skills Awareness Program embodying these principles is being conducted in 2002 with Environmental Science degree students. The results of the trial will be analysed with a view to developing a Faculty-wide approach for 2003.
- 2.4 The Faculty's Teaching and Learning Committee plays an important role in driving innovation and disseminating ideas within the Faculty. The Committee has a major role in the development of the Faculty's work on generic skills including providing materials, resources and feedback. All of the Faculty's unit of study outlines are being, or will be, reviewed in terms of generic skills development. The Faculty is liaising with other universities in Australia, the UK and the US to inform its deliberations.
- 2.5 Some departments, such as Biological Sciences, have their own generic skills group established to monitor generic skills development within the discipline, ensuring that all key skills are covered within the curriculum.
- 2.6 Undergraduate student feedback on generic attributes was mixed, ranging from excellent (BSc) to insufficient (BComp Sc). Some students felt that skills such as presentation, communication and problem solving skills were well developed in their course. While presentation work was noted as a positive experience, it could have been more beneficial if more feedback had been provided. The view was expressed that the assessment for first and second year Psychology programs was overly focused on multiple choice examination, providing little opportunity to develop writing or presentation skills. The same lack of opportunity to develop writing skills was also noted in relation to Computer Science and Applied Mathematics. Some students expressed regret at the absence of opportunities for work placements on the courses and indicated that they would welcome their introduction.
- 2.7 Feedback on generic attributes from students on taught postgraduate courses was also varied. Comments on the positive side included the following: skills such as team work and presentation on the Graduate Diploma in Psychology were thought to be very well integrated; Master of Nutrition and Dietetics students considered that their 20 week placement was invaluable in terms of skills development and developing industry links. Feedback from Urban Planning students was less favourable.

- 2.8 There seemed to be a good awareness of ethics issues among the undergraduate students, for example, two day courses in Ethics were available to Biochemistry students. Postgraduate research students complained of the slow turnaround time for matters referred to the Ethics Committee.
- 2.9 The Review Team welcomed the Faculty's commitment to the ongoing development and integration of graduate competencies and skills and was supportive of the initiatives currently in hand to foster improvement. It recommended that Faculty take note of the comments from students outlined above with a view to achieving greater consistency across the Faculty.

For Areas of Good Practice and Areas for Consideration for Improvement see ss 1.1.3 and 1.2.1.

3. ASSESSMENT

Scaling of marks

- 3.1 Members of Faculty indicated that scaling of marks is currently an issue of debate within the Faculty. Position papers have been prepared and the Faculty Standing Committee has had extensive discussions on this issue. Faculty considers scaling to be important in ensuring equity and accountability in assessment processes. However, it was recognised that the practice of scaling is not always consistent across the Faculty in terms of the form of scaling used. The devolution of responsibility for assessment to departments, plus the complications arising from joint and inter-disciplinary degrees, mean that it is difficult to arrive at any one solution that suits all. Feedback from students indicated concern and confusion around this issue. Staff noted that, while an institutional or Faculty policy would not be welcome, some centrally initiated discussion papers, perhaps emanating from an Academic Board Forum, would be helpful.

Effectiveness of assessment in measuring learning outcomes

- 3.2 In its self-evaluation report the Faculty had acknowledged that it does not have formal mechanisms in place to monitor the effectiveness of the assessment processes in achieving learning outcomes. However, these deficiencies had been noted and would be addressed in Departmental Reviews in future. In addition, Departmental Teaching and Learning committees would consider these issues. Course-co-ordinators also play a key role. Students receive information about assessment and learning outcomes via the Web and handouts. The Review Team welcomed these strategies and was pleased to note that students expressed confidence about their understanding of assessment requirements.

Group work

- 3.3 The biggest single issue of concern to students was that of the management and assessment of group work. High levels of concern about the fairness of group work assessment were expressed by both undergraduate and postgraduate coursework students, although the latter group also expressed some positive views on group work. Of most concern was the practice of allocating the same mark to all members of a group. Students indicated that often lack of performance by one member of the group could drag down the mark of all members, without any recognition of individual input. They felt that there was insufficient guidance from staff on how to address and resolve problems specific to working in groups. The view was expressed that some staff did not know how to guide students in gaining maximum benefit from group work. (see s. 1.2.2)

Feedback on assessment

- 3.4 The level and rapidity of feedback on assessment was reported by students to be variable. On the whole, there was a desire for more feedback, for faster feedback, and for more

opportunities for formative assessment. While the Review Team fully appreciated the difficulties in providing feedback and formative assessment opportunities when dealing with such large numbers of students, it recommended to the Faculty that it consider ways to improve the level of feedback to students, particularly for undergraduate students in first and second year (see s. 1.2.3).

Variety of assessment

- 3.5 A wide range of views were expressed by students on the variety and appropriateness of assessment. While there was appreciation voiced on the benefits of presentations and focus on problem solving skills in some areas, the Review Team heard many expressions of a wish for greater variety in assessment, and for assessment procedures that were more imaginative in terms of developing and assessing a range of transferable skills. There were comments regarding an over-emphasis on examinations, an over-emphasis on multiple-choice assessment, and too much weighting being placed on end of semester assessments, providing students with little opportunity to measure their progress in the lead up to the exam. Students from several areas also indicated that a greater focus on the development of written skills would be beneficial. Postgraduate students in Environmental Science expressed the view that a greater focus on field work would better prepare them for future employment. (see s. 1.2.4)
- 3.6 Staff explained that there were various logistical problems associated with the very large sizes of some of the first year units of study, such as the potential for plagiarism in non-exam based work, that made it difficult for staff to be as innovative as they would like in setting junior assessments.

For Areas for Consideration for Improvement please see ss.1.2.2, 1.2.3, and 1.2.4

4. RESEARCH-LED TEACHING

- 4.1 One of the Faculty's stated goals is to have all teaching staff research active, and all strong researchers involved in teaching. It was noted that the Faculty has a very successful research portfolio in some areas (the Faculty advised, for example, that the Department of Chemistry has been particularly successful in attracting ARC funding, receiving half of all of the Chemistry ARC grants in Australia).
- 4.2 The Review Team found the Faculty's approach to the integration of teaching and research to be exemplary in some areas, more so in relation to teaching at undergraduate Senior level (level 3) and above. Students from some discipline areas gave highly positive feedback on the way that staff research informed teaching. They cited this as one of the strengths of studying in the Faculty and indicated a good awareness of the research interests of staff. Students studying at undergraduate Senior level particularly appreciated the inclusion of research projects within their studies and the potential for these to link with the research interests of staff.
- 4.3 The Team formed the view, however, that the integration of research and teaching worked less well in some areas, particularly at Junior and Intermediate level (levels 1 and 2). In some Departments, for example Biomedical Sciences, research intensive staff did not participate in the teaching programs for the junior years, whilst others, such as Psychology and Chemistry explicitly integrated research throughout all levels. The Review Team noted a general perception among students that first and second years were given a low priority with regard to exposure to research. Some students expressed the view that staff approached first and second year students as though they were only capable of handling foundational work and were not capable of benefiting from engagement with cutting edge research. Students found

the engagement at Senior level with research active staff who were excited and enthusiastic about their subject to be very stimulating, but thought that it was a pity that this could not occur more in the earlier years.

- 4.4 Staff explained that in some discipline areas the varied nature of the student cohort necessitated an emphasis in the early years on developing fundamental knowledge and skills. The Faculty had noticed the impact of the increasing number of students finishing high school with inadequate basics in Science. Another factor is the need in some areas to rely heavily on part-time and contract staff, many of whom do not have high research profiles. Large class sizes in first and second years also play a part.

For Areas of Good Practice and Areas for Consideration for Improvement see ss.1.1.4 and 1.2.5

5. TEACHING AND LEARNING QUALITY

Emphasis on good teaching in the Faculty

- 5.1 The Faculty's Teaching and Learning Committee acts as the engine for developing and disseminating ideas on good teaching within the Faculty. It is currently focusing on the development of graduate attributes. A recent initiative has been the recognition of research on university teaching as a discipline in its own right; a group of core researchers has been established whose research area includes educational research into ways to most effectively teach within their discipline. This group has been collaborating with staff in the Faculty of Education. Such developments are indicative of a recent shift in emphasis that has taken place in the Faculty to give a higher profile to excellence in teaching. Thus, excellence in teaching is now a strong factor in promotions, and teaching and research are viewed as complementary and equally vital activities. The fact that Dr Adrian George, Director of First Year Studies in the School of Chemistry, received the 2001 Australian College of Education Teaching Award, was noted and commended by the Review Team, as was the Faculty's good performance record generally in University and national teaching awards (although it also noted that the Faculty could have raised awareness of these awards among students).
- 5.2 Staff reported that most schools have a mentoring scheme for junior staff. Teaching development grants are available to nurture the development of teaching excellence. All new members of staff complete the three day ITL teaching program in accordance with University policy.
- 5.3 The Faculty Teaching and Learning Committee had overseen the development of the Faculty Teaching and Learning Plan. The Committee includes representatives from all of the School Teaching and Learning Committees. This structure facilitates the dissemination and discussion of key initiatives like the Teaching and Learning Plan.

Student feedback on teaching

- 5.4 On the whole, the students met by the Panel commended the standard of teaching in the Faculty. They appreciated the interactive nature of the teaching environment and, particularly, the way in which research informed teaching and learning (for some students, particularly those at Senior level and above). Students considered many of their teachers to be dedicated and enthusiastic and found the Faculty to be a stimulating learning environment. There was some negative feedback, including adverse comments (detailed in s. 5.5 below) from undergraduate students about the standards of teaching by tutors. It was also noted that part-time teaching staff sometimes were not familiar with basic University practices, such as the marking system.

5.5 The SCEQs had identified student concerns regarding the standards of teaching by tutors. The Team also heard during discussions with students some strong negative feedback on the standard of teaching by tutors, and particular concern regarding the standard of teaching by Honours students. The view was expressed by one student that while it was acceptable to have Honours students supervising laboratory sessions, giving them major teaching commitments was not. The Team asked Faculty staff to elaborate upon the arrangements to safeguard the standards of teaching by part-time and casual staff. The arrangements varied across departments but included requiring junior staff to shadow senior staff, inviting tutors to attend ITL courses on teaching, an accreditation test for tutors (Mathematics), and a demonstrator certification scheme for laboratory demonstrators (Chemistry). Some disciplines, such as Psychology, try to develop integration and a sense of ownership of teaching by involving tutors in the review and redesign of courses. The Faculty acknowledged that it experiences difficulty in finding enough staff to teach courses in some areas.

5.6 Postgraduate research students interviewed by the Review Team, eight of whom taught in the undergraduate program, indicated that they were not required to complete any teaching courses. A small minority had completed courses and some expressed the view that they did not have the time to complete such courses.

Transition workshop

5.7 A successful innovation in the Faculty has been the introduction of the Transition Workshop and Parents' Program, which about one third of new students participate in. These initiatives aim to assist students in the transition from high school to university life. The scheduling and grouping of students in the Transition Workshops is designed in alignment with laboratory and tutorial groups to facilitate networking and socialising. The Review Team received very positive student feedback on the effectiveness of these groups, with students indicating that they had started enduring friendships and suggesting that they were so valuable that they should be made compulsory rather than optional. The Faculty indicated plans to design a shorter program that could target all new students. The Review Team commended the Transition Workshop as an example of good practice, particularly in terms of pro-actively supporting student welfare and retention.

On-line learning

5.8 The Faculty has long been an advocate of on-line learning as a means of supplementing face-to-face teaching. Most units of study have some degree of web presence and practices include use of web-based laboratory exercises, on-line tutorials and pre-work for laboratories. Lecture notes and course information such as unit of study outlines and assignments are commonly available on the web or via Web CT. The Faculty's IT Taskforce investigates on a continuing basis how to drive innovation and respond to University initiatives. The Faculty Teaching and Learning Committee monitors the consistency of quality across the Faculty and a practice of charging one School with monitoring the materials of another School has recently been implemented. School and Department Teaching and Learning Committees also contribute to the overall quality assurance of on-line learning.

5.9 Student feedback on web support was very positive, although some found that the variety of web styles and links could be confusing. Students also liked being able to give anonymous on-line feedback on teaching.

Policy dissemination within the Faculty

5.10 The Faculty tends to target individual University policies to particularly promote at a given time: currently these include Academic Honesty (Plagiarism) in Coursework, Assessment and

Examination of Coursework, Intellectual Property and Generic Attributes of Graduates. The Faculty Teaching and Learning Committee, the Dean's Advisory Committee, the Faculty Standing Committee and the School Teaching and Learning committees all play an important leadership role in policy development and awareness. Discussion via the committee structure is supplemented by circulation for comment through the Faculty, for example from the Dean to Associate Deans and Heads of Schools and Departments. The Review Team was impressed at the effective and comprehensive arrangements the Faculty had in place to ensure appropriate dissemination, discussion and implementation of Academic Board and Faculty policy.

Links

- 5.11 A significant achievement for the Faculty in recent years has been the successful development of greater inter-disciplinary links within the Faculty. This move to a more broad-based approach has resulted in the introduction of inter-disciplinary degrees and majors in areas such as Medicinal Chemistry, Computational Science, Molecular Biotechnology, Marine Science, Molecular Biology and Genetics, Environmental Science, and Bioinformatics. These have been popular with students, for example the collective enrolments across the Biotechnology degree are around 100.
- 5.12 There has also been a move to developing inter-disciplinary links outside the Faculty, for example in Geography and Urban and Regional Planning, and outside the University, for example a joint course in Tropical Marine Science with the University of Queensland.

For Areas of Good Practice and Areas for Consideration for Improvement please see ss.1.1.5, 1.2.6 and 1.2.7

6. EVALUATION AND QUALITY IMPROVEMENT

- 6.1 The Review Team commended the Faculty in running effective staff/student liaison committees at undergraduate level. Student awareness of the committees was high and they spoke favourably of the open and collegial nature of their operation. However, follow-up to meetings was felt to be lacking and most students were unclear as to what changes, if any, had been implemented as a result of their feedback in meetings. At least one department posted changes and responses to student feedback on the Web and this was appreciated by students. The frequency, timing and perceived effectiveness of the meetings varied considerably between departments. The students felt that meetings which occurred within each semester, as in Chemistry, had much more potential to make effective changes than those which only met once and at the end of the year as in some other departments.
- 6.2 Postgraduate research students were unaware of the existence of the Faculty's Postgraduate Studies Committee and had minimal involvement in any Faculty committees. (Faculty's attention is drawn to Strategy 3 of the CST 10-point plan on Postgraduate Research Training Protocols which requires Departments and Faculties to have effective Postgraduate Student Committees.) (see s. 1.2.9)
- 6.3 As well as the University SCEQs, the Faculty collects student feedback from its own questionnaires on teaching. These included anonymous on-line questionnaires and Faculty staff had found these to be extremely effective, having both a high response rate (close to 100%) and honest and fair feedback. Students also indicated that they liked the anonymity and convenience of the on-line questionnaires, as well as the (not widespread) practice of staff posting the outcome of feedback on the website. While the Review Team welcomed the

variety of ways in which the Faculty gathered feedback, it suggested that improvement was needed in mechanisms for advising students of the outcome of student feedback.

- 6.4 The Review Panel noted and welcomed the input (as described in the documentation) of external academics and practitioners to the Faculty's course and departmental reviews.
- 6.5 The Faculty Undergraduate Studies Committee controls the quality of new units of study and checks issues such as overlap. There has been a move towards providing lecture descriptions for all 24 lectures within a unit in the unit of study outline, which is viewed by the Faculty as a positive development. It views itself as being pro-active in identifying problem areas and addressing them, for example a two year appointment was recently made in the Department of Information Technology specifically to look into quality issues in the department.
- 6.6 While the Review Team formed the view that the Faculty had a co-ordinated approach to collecting student feedback, it considered that the way the Faculty disseminated and responded to the feedback was an area for improvement. This was both at the staff level (for example, it was apparent that some staff were not aware of issues raised in the SCEQs), and at the student level (students indicated they were not well informed of changes made as a result of their feedback). This was an area where the Review Team felt that the Faculty was not sufficiently aware of or following Academic Board policy (for example, the Guidelines for Good Practice in Teaching and Learning, particularly s. 5.2).

For Areas of Good Practice and Areas for Consideration for Improvement please see ss.1.1.6, 1.2.7, 1.2.8, and 1.2.9)

7. STUDENT PROGRESSION

- 7.1 The Faculty acknowledged that monitoring student progress was a challenge when working with such large numbers of students, and in some discipline areas, very large class sizes. A range of strategies is in place to support retention: students are monitored in practicals and laboratories where the staff:student ratio is at its most favourable; the Transition Workshop has helped to build a supportive and collegial student environment; and bridging courses assist students in overcoming weak areas. The Faculty viewed the rise in UAI from 72 in 1999 to 81 in 2002, with an increase in the mean UAI of 1.5 points, as a very significant achievement and one which was also likely to improve retention and progression rates. This year a particular target in supporting student retention has been the implementation of a mechanism to identify and contact all students who have failed two units or more in first semester. As recorded elsewhere in this report, students reported varying levels of satisfaction with arrangements to support their progression in terms of feedback on assessed work and opportunities for formative assessment.
- 7.2 A further challenge to student progression and retention is the level of background knowledge in Science among students, particularly those at the lower UAI end of the intake. Members of Faculty had sought to address this issue with mechanisms such as those outlined above, but noted also that the recent collapse in employment in IT will mean that there will be fewer applicants who are not genuinely interested in or committed to their discipline. The Review Team encouraged the Faculty to review its admission policy, and its practices for identifying and rectifying weaknesses of entrants, such as requiring certain students to take mandatory bridging courses.

For Areas of Good Practice and Areas for Consideration for Improvement please see ss.1.1.7, 1.1.8, and 1.2.11

8. RESEARCH SUPERVISION AND TRAINING

- 8.1 Research supervision is managed within the Faculty on a Departmental basis in accordance with Protocols devised by the Faculty's Postgraduate Studies Committee. A program of reviews of Department's supervision practices is currently underway. These involve questionnaires, visits, and meetings with the Head of Department, students, Postgraduate Co-ordinators, and supervisors.
- 8.2 The majority of feedback from postgraduate research students on the quality of supervision was very positive. However, it was suggested that a more structured underpinning in research methods and statistics would be highly desirable. Staff indicated that this issue had been discussed recently at the postgraduate Studies Committee. Currently such programs are developed at departmental level, which is seen as necessary in order to achieve maximum relevance to the discipline area. However, it was acknowledged that greater co-ordination may be needed at Faculty level to ensure quality across all areas. Some students also expressed a wish for guidance on how to deal with the relevant industry, while others found that their links with industry worked well. Students appreciated the value of the end of year progress report.
- 8.3 Students reported wide variation across disciplines in the quality of the facilities to support research students, ranging from excellent to very poor. The facilities available were often linked to whether or not a student's research linked with a funded project. In some areas the computing facilities were reported to be minimal and outdated. In some instances the resources are perceived to be either not available in the faculty or eroding in quality over time. Lack of resources can impact on the time taken for completion. In addition, the time taken for ethics approval is a considerable impediment to progress.
- 8.4 Students reported variable knowledge about opportunities for funding for conferences. Some students had received funding to attend several conferences while others did not know how to obtain funding. International students were under the impression that they were not eligible to apply for the funding that was available. Faculty staff believed that funds were equitably distributed.
- 8.5. Students were unaware of the University's Academic Board code of practice for postgraduate supervision. Approximately half of the students interviewed were aware of the University's directives regarding Intellectual Property. Most had received a copy of the Postgraduate Research Studies Handbook and had found it useful.
- 8.6 In accordance with Academic Board policy, Research supervisors are often paired so that a less-experienced supervisor works alongside an experienced supervisor. Some areas (eg IT) make completion of the ITL course a condition of employment for research supervisors. Others (eg Chemistry) have in place a mentoring scheme.
- 8.7 The Review Team considered that the Faculty's strong research record is reflected in the quality of the research training provided for students. The Review Team commended the Faculty on the receipt by two members of Faculty staff of Excellence in Higher Degree Research Supervision awards for 2001. In some areas, the integration of research and teaching was considered commendable and the Review Team noted the positive feedback from students from some areas in this regard. In terms of improvement, the Review Team suggested that the Faculty may wish to look into the area of facilities to support research students, bearing in mind Academic Board policy on supervision facilities. The Review

Team acknowledged that it is appropriate for there to be diversity in the nature of the support (in terms of facilities and funding) provided to research students across the Faculty's discipline areas, but considered that consistency is desirable in terms of the *quality and equivalence of standards* of the support.

- 8.8 The Review Team did not form a clear idea of the level of the Faculty's compliance with the College's Ten Point Plan and accordingly identified this as an issue that the Faculty may wish to consider.

For Areas of Good Practice and Areas for Consideration for Improvement ss 1.1.10 and 1.2.11.

9. COMBINED DEGREES

- 9.1 Student feedback, both from the SCEQs and the discussions with the Review Team, revealed a considerable level of dissatisfaction among combined degree students regarding the management, organisation and administration of combined degree programs. Students found it difficult to gain accurate information on a range of issues such as unit of study and credit point requirements, permissible subject combinations, and where to go to obtain information,
- 9.2 The Faculty noted its intention to look into the arrangements for managing combined degrees. Currently there are co-directors of joint degree programs (such as Liberal Studies) but it was acknowledged that this is an area for improvement.

For Areas for Consideration for Improvement please see s. 1.2.12

10. MESSAGES TO THE DEAN

At the end of each interview, the students and staff were asked what message they would like to give to the Dean. The following responses were received:

Students

- The shortages of administrative and teaching staff are regrettable, although the efforts of staff to minimise the effects were recognised
- Aware of fact that in recent years there have been major increases in student numbers at the same time as major decreases in human and physical resources
- Highly commend the Faculty and the education it provides
- The opening hours of the Faculty office need to be longer and more flexible.

Staff

- Appreciate the enthusiasm and collegiality prevalent in the Faculty and the strong leadership by the Dean

APPENDIX ONE: FACULTY SELF-EVALUATION REPORT

ACADEMIC QUALITY ASSURANCE FACULTY OF SCIENCE SELF-EVALUATION REPORT 2001

The Faculty of Science is located in the College of Sciences and Technology. It is one of the University's largest faculties, offering several degree programs: Bachelor of Science, Bachelor of Medical Science., Bachelor of Computer Science and Technology, Bachelor of Psychology and the specially designated B.Sc. degree programs of Advanced, Advanced Mathematics, Bioinformatics, Environmental, Marine, Molecular Biology & Genetics, Molecular Biotechnology and Nutrition. Jointly with the Faculty of Arts, it offers the Bachelor of Liberal Studies as well as combined degree programs with Arts, Commerce, Education, Engineering, Law and Nursing. Additionally, the Departments/Schools within the Faculty perform a service teaching role for faculties such as Agriculture, Arts, Dentistry, Engineering, Medicine and Pharmacy.

The size and complexity of the Faculty is reflected in the following statistics for 2001:

Number of Departments/Schools:

Devolved: 8 (plus approximately 6 units/centres)
Other Teaching: 6 (2 Agriculture/4 Medicine)

Number of Students:

Undergraduate: 4186
Postgraduate: 770
Liberal Studies: 446
Load (EFTSU): 5634

Number of Academic Staff:

Devolved: 372
Other teaching Departments/Faculties: 143
(numbers based on definition as per Faculty of Science constitution).

Number of Degree Programs

UG: 16 (includes streams & combined)
Joint: 1 (LibStud)
PG Coursework: 40
PG Research: 4
(also there are a further 5 Undergraduate combined programs run by the other partner faculty)

As stated in the Faculty of Science Strategic Plan for Teaching and Learning (Appendix 1), the mission of the Faculty of Science is 'to be a provider of world class research based education in science that is valued by the students, their employers, and the general community. To this end, the Faculty of Science has in place a number of procedures and policies that monitor academic quality. These include:

- A Teaching and Learning Committee with representatives from all Schools/Departments was established in 1994 to target effective teaching practices and promote innovations in teaching. The scope of issues addressed by this committee can be seen in the Teaching and Learning Portfolio (Appendix 2).

- An Undergraduate Studies Committee (UGSC) which vets all new Undergraduate Degrees and Units of Study.
- A Postgraduate Studies Committee which oversees all Postgraduate Degrees/Units of Study.
- A policy of regularly reassessing the effectiveness and relevance of its degrees and ensuring that the recommendations arising from these reviews are implemented (see Appendix 2).
- A policy of reviewing Departments in the Devolved Unit (generally once every five years). The review program and terms of reference are provided in Appendix 2.
- A Faculty of Science Strategic Plan for Teaching and Learning 2000-2004, and a Faculty of Science Operational Plan for Teaching and Learning 2000-2001 (Appendix 1(a) and (b)).

1. *How does the faculty ensure that each course and unit has an appropriate set of aims and outcomes, clearly communicated to and understood by students, and including generic as well as disciplinary skills?*

All new Degree Programs/Units of Study must be approved by the Standing Committee/UGSC. The information required by the UGSC (see form – Appendix 3) includes the aims and outcomes of each Unit of study.

(a) Systems for informing students about course and unit expectations and ensuring that students understand them:

- Information about Courses and Units of Study is in the Faculty Handbook, available on the Web and in paper format (Appendix 4).
- Access to Department/school and Faculty advisers (listed in the Faculty Handbook).
- Access to appropriate Associate Deans (two Undergraduate Advisers, Liberal Studies Adviser, Medical Science Adviser). The Associate Deans see students by appointment and are available at a number of times each week.
- Departments provide information about each Unit of Study, including unit expectations, to all students. This information is to be on the web (in WebCT) for all Units of Study offered by faculty by the end of 2001 (encouraged by Dean and helped by UniServe Science).

(b) Ways in which relations between generic and disciplinary skills in the curriculum are monitored:

- Monitored via the Degree Reviews, in particular for the professional degree programs. In 1995 a review of all the degree programs was carried out by a review committee comprising both internal and external representatives. The report of this committee was accepted and adopted in its entirety by the Faculty. In 1998 a review of the Bachelor of Medical Science was conducted and in 1999 the BSc was reviewed. The major outcomes of these reviews are outlined on p13 of Appendix 2. In 2001 the BSc (Nutrition) and BSc (Environmental) are being reviewed, while in 2002 the BSc (Molecular Biology and Genetics) and BSc (Bioinformatics) are scheduled for review. Additionally, the Dean has flagged for 2002 a review of Intermediate Units of Study in the BSc curriculum, particularly in life and medical sciences.
- Program Committees are in place for several degree programs including BSc(Environmental), BSc(Marine Science), BSc(Molecular Biology and Genetics), BSc(Molecular Biotechnology), BSc(Nutrition), and BMedSci.

- Monitored via Departmental Reviews, in particular for units of study. The composition of review panels, terms of reference, schedule of reviews and examples of outcomes of these reviews are presented on pages 12-13 of Appendix 2. Additionally, in 1998 the Department of Psychology was reviewed by the professional body responsible for accrediting psychology programs in Australia (the Australian Psychological Society). The recommendations of this review have been implemented by the Department.

(c) Methods for ensuring that courses and units of study enable students to achieve intended learning outcomes:

- Curricula related to aims/expectations – vetted by UGSC for new Units of Study
- Degree/Dept reviews for existing Units of Study.

New Units of Study are carefully examined at the Faculty level before their introduction. This includes both content and applicability within a degree program or several degree programs. Established units of study are then reviewed within a departmental review (every five years).

(d) Methods for providing coherence between units of study and courses:

- New courses – Faculty Standing Committee
- New Units – UGSC
- Professionally accredited courses - independent review by accreditation body
- Regular review of courses and Units of Study to ensure coherence.

There is a need for closer links between the committee examining new courses and the committee examining new units within these courses. This problem has been referred by the UGSC to the Dean. In response, the Dean has instituted a curriculum and degree review group comprising the Dean, Chair of UGSC, Pro-Dean and an Associate-Dean plus a curriculum adviser from the area under examination. The first task for this group will be to specify goals for each of the degrees and majors such that the relevance of Units of Study to these goals can be evaluated.

2. How does the faculty ensure integration of research, including both disciplinary research and evidence about effective learning and teaching, into its undergraduate and postgraduate courses?

(a) How links between current disciplinary research and the research expertise of staff and the curriculum are managed:

- Selection of staff to enhance teaching programs (selection process heavily vetted by Dean and College PVC).
- Review of curricula in degree programs

(b) How links between developments in the theory and practice of university teaching and learning and the curriculum are managed:

- Faculty Educational Research Group (SCIFER) was set up in 2000. This group has promoted interdisciplinary seminars on T&L and has encouraged interdisciplinary research projects funded by the Dean (through SCIFER).

- Encouraging departmental research groups that work on educational issues (eg SUPER in Physics, RIBET in Biological Sciences, SUTMEG in Mathematics and Statistics). These groups have undertaken research into educational issues relevant to their areas. This research has been regularly disseminated through reports and conferences and has resulted in changes in teaching practice in those areas and the Faculty generally. Reports from these groups are provided as Appendix 5.
- Encouraging departmental teaching development groups that implement learning theories into new teaching practices. The First Year Biology Teaching Development Group is an example of such a group. A copy of its Annual Report for 2000 is provided (Appendix 6).
- Encouraging dissemination of T&L activities (e.g. by financial support of appropriate conference attendance).

3. How does the faculty ensure that student assessment is effective and contributes to learning, and that the assessment process is well understood by students?

(a) Methods for ensuring that assessments enable students to achieve intended learning outcomes:

- Currently responsibility of departments. At present the Faculty does not have appropriate monitoring in place. However this has now been brought to the attention of the Dean who has indicated that this issue will be included in Departmental Reviews.

(b) Methods for ensuring that assessment practices and standards are fair and equitable:

- Faculty receives departmental reports on assessment practice and advises where necessary.
- Distribution of marks within years reviewed by a Merit Grades Committee chaired by the Pro-Dean. The Committee requests and monitors change where necessary.

(c) Methods for ensuring that assessments provide students with prompt and effective feedback on their progress:

- Faculty encouragement through the T&L committee for early, relevant feedback (particularly in the first year).
- End of semester assessments finalised within University guidelines

(d) How information from assessments is used to improve teaching and learning:

- This is largely a departmental responsibility (at the level of Units of Study - under the control of unit coordinators). Faculty monitors marks distributions (see b above) but not the impact of this upon teaching and learning.

(e) Methods for ensuring that students understand the assessment processes:

- Information is available in unit of study outline on the Web (Departmental responsibility).

4. How does the faculty ensure the quality of its teaching and recognise good teaching?

The Teaching and Learning Committee's brief when first established in 1993 was to target effective practices, to advise on matters pertaining to teaching and to liaise with departments over teaching issues.

(a) Methods for monitoring the breadth, depth, pace, variety and challenge in teaching:

- Introduction of Faculty-developed unit evaluation questionnaires (before the University advised all units would evaluate their effectiveness).

- Faculty reviews degree programs and requires departments, via formal curriculum committees, to review all units of study. By 2002 all departmental curriculum committees will be required to have an external member.

(b) How decisions about the selection of particular teaching strategies in relation to student learning outcomes are monitored:

- Departmental responsibility and Faculty currently has no monitoring process in place.
- Professional degree programs are monitored by the accreditation body. This includes examination of teaching strategies.

(c) Methods used to enhance the quality of teaching, including staff development, mentoring and peer review:

- Teaching development fund (approximately \$100K per year).
Over a five-year period (1995 – 1999) the TDF has funded a number of initiatives that have made changes to the content, delivery and assessment practices of units of study and these have led to improved learning experiences.
Example 1: In 1997 the Faculty offered grants under the initiative Student Progression Assistance Scheme (SPAS) which acknowledged that the newly introduced semester length units of study might pose problems for student progression. In particular first year unit coordinators were asked to develop strategies to identify students at risk of failing and to offer opportunities to students to remedy the situation. For example, a successful mid semester mock exam was developed in biology and geology, with accompanying web-based support materials for those students who self-identified areas of weakness.
- Early career teaching awards (awarded every two years). This award acknowledges good teaching practice in junior academic staff and is an encouragement to continue to develop excellent teaching practices.
- Funding linked to University teaching excellence awards (awards are current for a five year period). The funding is an encouragement to academic staff in departments to (i) acknowledge good teaching practice from members of the department and (ii) for Heads to support good teachers in their application for awards. Between 1994 and 1999 the Acting Dean and the Associate Dean (Teaching) actively targeted a group of Faculty staff each year and helped with the development of applications for these awards. The outcomes were 16 individual awards out of a total of 30 awards and one group award (to four applicants).
- Encourage staff to participate in ITL programs.
Heads of Departments encourage staff to attend; the Associate Dean (Teaching) also sends out information through the Teaching & Learning Committee about the programs available. Early completion of the 3-day “Principles and Practices of University Teaching and Learning” course at the University’s ITL is a requirement of confirmation of all new appointees to the Faculty.
- Encourage staff to attend appropriate T&L conferences and in some instances help fund attendance. Attendance at conferences has been supported since 1995. Academic staff make application to the Dean through the Associate Dean (Teaching) for support which is available if the staff member is giving a paper at the conference.

(d) How the faculty supports, recognises and rewards good teaching:

- The Faculty has encouraged and supported all aspects of teaching and learning, especially staff development opportunities (see point (c) above).

- In 2000 many of the successful promotion candidates were able to base their success on outstanding teaching. Outstanding teaching also featured very strongly among those who also had outstanding research.

5. *What arrangements does the faculty have in place to monitor and support student progression?*

(a) Arrangements for identifying students at risk of non-completion or failure and the processes used to intervene in these cases:

- Ensure realistic UAI cut-offs for each degree program
- Bridging courses available to weak students or students without sufficient background on entry
- Student Progression Assistance Grant Scheme (1997 – 1998) set up to identify students at risk and to offer special help (e.g. mid-semester exams or mock exams, remedial web-based tutorials and self assessment modules)

(b) The use of learning resources and academic support to assist student learning outcomes:

- Student transition workshop and parents' program (1996 – current)
- Mathematics Learning Centre (until 2000, the Centre was part of the Faculty)
- Student access computer centre (McGrath Laboratory, Carslaw)
- Departmental computer facilities funded in part by Faculty
- Improvement of laboratory facilities across the Faculty

6. *How does the faculty ensure the quality of research supervision and training?*

There is a Postgraduate Committee of Faculty that oversees all aspects of postgraduate quality assurance. The Postgraduate studies committee is made up of postgraduate coordinators from all schools/departments, thereby providing rapid feedback to supervisors and students.

(a) Arrangements for ensuring high standards of supervision:

The Faculty policy document 'Postgraduate Research Guidelines' specifies a number of requirements with regards to supervision:

- All postgraduate students will have a supervisor and an associate supervisor.
- Supervisors must already hold the relevant degree (or a higher degree) before supervising a candidate for that degree.
- Departments will include supervision in staff workload determinations.
- Departments will monitor the performance of supervisors and take this into account when making decisions about appointments of supervisors.

(b) Mechanisms in place for ensuring effective completion and retention:

Faculty Postgraduate Research Guidelines state:

- Applications for PhD or MSc (Research) cannot be accepted unless there is a strong likelihood that the candidate will complete inside the maximum time. Departments should ensure that they have sufficient information about an applicant to make this decision. This may require seeking additional information from the applicant, from referees, or by interviewing the applicant.
- For acceptance to PhD candidature an applicant must have first class honours or its equivalent. In the latter case a department must provide explicit justification, which should indicate that the applicant has received preparation for research equivalent to that gained during honours, and achieved a superior performance equivalent to first class level. A Masters degree including a substantial research component satisfies this requirement.
- For acceptance to MSc (Research) candidature an applicant must have at least second class honours or its equivalent, which must include a substantial research project.

(c) How the research climate for students and provision of resources to support research are monitored:

- Faculty initiated a benchmark for facilities for all research postgraduates which became a University standard (from the Academic Board)
- Each year the Postgraduate Studies Committee collects information from schools/departments on facilities available, comparing them with University standards. Faculty has provided funds to upgrade facilities in those areas requiring it.

(d) The use of student and/or graduate views to improve the experiences of research higher degree students:

- Each school/department has a student postgraduate representative who is a member of the school/department board, and each has postgraduate meetings where student views are put forward.
- Faculty questionnaire on exiting students.

Postgraduates are encouraged to become part of the University's community of scholars, participating in research seminars and social gatherings, as well as gaining some teaching experience (for those desiring it) and voluntary involvement with consultancies.

7. What are the faculty's arrangements for evaluation and quality improvement, including the use of student and graduate feedback and other performance indicator data to monitor and enhance performance? How does it recognise good teaching?

(a) Mechanisms in place for collecting and acting on the results of student and graduate feedback on teaching, units of study and courses:

- Under the direction of the T&L Committee, faculty ensures that departments have mechanisms in place to regularly conduct student evaluations of all Units of Study (every three years). Survey feedback is reviewed by Heads of Department/School who focus attention on areas needing improvement.
- T&L Committee reviews feedback from CEQ and SCEQ and recommends action where necessary. For example, in 2001 the SCEQ data indicated that there was a need for uniform clear statements of expectations for all Units of Study. This has resulted in the Teaching and Learning Committee assigning departments/schools to peer review another department's/school's Unit of Study descriptions, including goals and assessments.

- Faculty has a representative on the Evaluation and Quality Assurance Working Party. This person reports to the T&L Committee, which recommends action.
 - Faculty has a representative on the First Year Experience Working Party. This person reports to the T&L Committee which recommends action.
- (b) Arrangements for applying University performance indicator data to improving educational quality:** As for (a) above.
- (c) Consistency between University requirements and Faculty QA and improvement mechanisms:** Faculty QA and improvement mechanisms are implemented by the Teaching and Learning Committee in response to the Dean's instructions to reflect Academic Board requirements. In this sense the Faculty's procedures are consistent with University requirements.
- (d) Methods used to monitor progress towards goals specified in the faculty's teaching and learning plan:**
- Faculty T&L committee review the operational plan every six months and advise the Dean on progress

APPENDIX TWO: FACULTY TEACHING AND LEARNING PLAN

Faculty of Science Operational Plan for Teaching and Learning 2000-2001

AN UPDATE, SEPTEMBER 2001

Objective 1: Offer students a positive total experience, leading them to feel part of the university community.

Strategy 1.1: Explicitly ease students through transition to university.

Operational Plan: The Faculty has been running a voluntary transition workshop for new students since 1996. The workshop provides a one-day orientation and group workshop for incoming students and their parents. As part of an educational research project, the academic performance of the 1998 and 1999 cohort of students was compared with the performance of students who did not attend the workshop. It was shown that participation in the workshop had a demonstrable positive impact on the academic performance of students who attended the workshop.¹

The transition workshop needs to be extended in two ways: i) to make it more readily available for all incoming students (and their parents initially); ii) to extend the duration of the transition program into the first few weeks of first semester.

Timing: Planned during 2000 and ready for full implementation for the incoming class of 2001.

Responsibility: Faculty office, with input from Associate Professor Peat (A/Dean, Teaching).

Indicators: An extended transition program for 2001. Lowering of the initial drop-out rate between enrolment and census date from the current 10% to 9% in 2001, lowering by 1% per year until 5% objective achieved.

Action – review August 2001

- The Transition Workshop is now available to all incoming students. It has been extended to include the BLibStudies students. The current uptake is about 30% of the cohort.
- Extend the duration of the transition for a few weeks – this has been done by asking that all first year units have a cooperative, peer group activity in the lab or tutorial programs for at least first semester. This occurs in Biology, Physics, Computer Science.

Indicators (withdrawals in relation to enrolments in science).

- 1999, 1243 first year students enrolled, 144 withdrawals – withdrawal rate = 11.58%
- 2000, 1341 first year students enrolled, 125 withdrawals – withdrawal rate = 9.32%
- 2001, 1417 first year students enrolled, 114 withdrawals – withdrawal rate = 8.04%

As the initial withdrawals cannot be identified as subsequent enrolment in other areas of the Faculty, and this will have occurred to some extent, the actual rate of withdrawal may be lower.

2002-2003 operational plan

¹ M. Peat, J. Dalziel and A.M. Grant, *Innovations in Education and Training International*, 37(4) 293-303 (2000)
M. Peat, J. Dalziel & A. M. Grant, *Higher Education Research & Development*, 20(2) 199-215 (2001).

- More marketing will be done to extend the uptake for the Transition Workshop. In addition, a letter will be sent out by the Faculty to those who attend the 2002 transition workshop, asking them to extend their peer networks to include students in their classes who did not attend the workshop.
- An alternative workshop will be offered in 2002 for those students and parents who do not take part in the Transition Workshop. This will consist of an evening session which will be offered during the first three weeks of semester 1.

Strategy 1.2: Have each student identify with a cohort of peers who can provide mutual support in study and life.

Operational Plan: The School of Mathematics provides the only program that is taken by *all* Junior students, through the suite of Junior Mathematics Units. This would seem to be the most effective way to ensure that all students are exposed to a single program, aimed at increasing the social interaction between students, and between staff and students. The program should take advantage of the interactions that were developed in the transition program (Strategy 1.1).

Timing: Implementation of a First Year Experience program within the School of Mathematics may require restructuring of the way in which Mathematics is taught (e.g. tutorial structure). As such, planning should commence in 2000 with the objective of getting all course changes to the Academic Board by mid-2001, for implementation in 2002.

Responsibility: Head of School of Mathematics, plus Associate Professor Peat (A/Dean, Teaching).

Indicators: A planned First Year Experience program ready to go to Academic Board by mid-2001. Success gauged by lowering of longer term (post-census date) drop-out rates (incl. absent fail) and on-time completions.

Action – review August 2001

- Mathematics and Statistics have “friendly face” tutorials at the beginning of each semester which are designed to welcome the students, make them feel comfortable in a tutorial situation, to help them make friends and to clarify any concerns regarding enrolment.

2002-2003 operational plan

- For 2002, include information about other units of study in the welcome tutorial.

Strategy 1.3: Have processes that help each student identify with a group across years having similar academic interests

[To be left until new degree structure is implemented. For action in second half of 2001]

Action – review August 2001

- Some models were piloted in 2001; the Biological Sciences model is attached in Appendix 1. Other models are in place in Psychology.
- The Faculty reorganized the handbook entries to facilitate identification of pathways to majors. The new handbook will be in operation in 2002.

2002-2003 operational plan

- From 2002, majors will be identified during the enrolment period.
- Pathways projects will be introduced in other departments and schools.

Strategy 1.4: Have each Unit of Study make goals and relevance clear.

Operational Plan: Clear learning goals and objectives, which are assessed properly, form the basis of a good learning experience for students. All new Units of Study will be required to specify clearly the educational goals, and the mechanism by which the outcomes will be assessed. This strategy is also linked to Strategy 5.2.

Timing: All existing Units will be required to specify their learning goals and assessed outcomes within two years. All new Units will require this information before Faculty approval.

Responsibility: Associate Professor Peat (A/Dean, Teaching), Faculty Teaching Committee.

Indicators: All Units of Study with clear and relevant goals. Improvement in CEQ data on “clear goals”.

Action – review August 2001

- Members of the T & L Committee are auditing the units. Report expected by the end of November.

2002 – 2003 Operational Plan

- A new generic skills self-assessment system will be piloted in 2002, and if successful introduced in 2003. Associated with this all staff will be asked to identify which generic skills are addressed either implicitly or explicitly within each unit. This too will be reviewed by the T & L committee.
- Monitor progress against changes to the CEQ “clear Goals” scale.

Objective 2: Establish links between degree outcomes and employer needs

Strategy 2.1: Know the primary destination of our graduates.

Operational Plan: Except in some specialist areas and through some departmental organisations, we do not know the primary destination of our graduates in any quantitative measure. Because of this, we cannot know whether the skills (both discipline related and generic) we are teaching students are the skills that are valued by those who employ our graduates. We will survey our graduates around mid-year so that they have had a reasonable time to find employment. This process should be streamlined so that it can be repeated every year and so changes in the employer demographic can be monitored in real time.

Timing: This needs to be started immediately as other strategies rely upon its completion. The survey should be implemented by mid-year and data available by the end of the year.

Responsibility: Heads of Department responsible for major areas of study and degree programs. .

Action – review August 2001

- The Faculty has surveyed all students who graduated in 2000 and five years earlier. These data have been used to reform programs and monitor progress. The responses highlighted the importance of working from within the Departments and Disciplines to maintain an Alumni, not the Faculty because of the diversity of areas covered by the BSc.
- Chemistry is setting up a pilot program (funded by the Dean) to follow their graduates into their professional placement. The program will be transferred across the rest of the Faculty over the next months.

2002-2003 operational plan

- Discipline programs will be set up following the successful completion of the Chemistry pilot. The continued contact with Alumni is important for development purposes as well as building industry links for research and consulting.

Strategy 2.2: Have employers review and advise on curriculum.

Operational Plan: Leading on from strategy 2.1, the database of employers should be used to establish the key employer groups for our graduates. These employer groups will be invited to have input into the skills that students learn in the Science degrees. This will be done through employer advisory committees for each Major.

Timing: Immediately strategy 2.1 is complete. Advisory committees will be set up

Responsibility: Dean and Pro Dean

Indicators: Active advisory committees that have impact in our graduates' skill base. Employer satisfaction. In the long term this should impact on external CEQ data.

Action – review August 2001

- The many Foundations within the Faculty have external members on their committees. This includes Human Nutrition, Earth Resources, Physics, Computer Science.
- Several degree programs have external members involved in ongoing reviews of the programs, for example BPsych, BSc (Environmental Sciences), BSc Molecular Biotechnology and the Bachelor of Information Technology.
- Some medical science discipline areas have external membership on curriculum committees, e.g. Pharmacology
- Some postgraduate coursework programs have been developed with external input (eg Environmental Science, DPsych/PhD and DPsych/MSc, Wildlife Management, Quantitative Marine Ecology, Photonics).

2002-2003 operational plan

- Set up advisory committees with external membership in all discipline areas.

Objective 3: Broaden our student base to broaden our funding base

Strategy 3.1: Develop a flexible post-graduate “generic” structure to facilitate easy mounting of “valued-added”, fee-paying courses.

Operational Plan: A consequence of the changing nature of a university qualification is that graduate skills are always changing. An opportunity therefore exists to provide training for people already in the workforce. These courses will be post-graduate, part-time and confer upon the student a Grad. Cert., Grad. Dip. or M.Sc. These three qualifications will be mutually consistent, and allow a student to upgrade their program from Certificate to Diploma to Masters at any time. The qualifications that are offered in the Faculty should be flexible, according to demand. Degree structures must be able to be mounted with a short lead time and so a generic Cert./Dip./Masters degree structure should be agreed. Where a new program conforms to the accepted structure it should be able to be offered with minimum lead time (less than 1 year is optimal).

Timing: This initiative is already in progress and should be complete by mid-year.

Responsibility: Associate Professor Dragovich (A/Dean, Post-graduate Coursework)

Indicators: Generic degree structure agreed and implemented. Lead time of less than 1 year accomplished. 20% per year increase in enrolments in fee-paying post-graduate courses.

Action – review August 2001

- The generic Certificate, Diploma and Masters of Applied Science set of articulated programs has enabled easy development of new degree areas in Environmental Science, Wild-life Management, Neuroscience, Photonics and Molecular Biotechnology. Some programs are yet to begin, and others have been deferred pending the introduction of the PELS scheme. Progress has been mixed, with some reluctance on the part of students to pay full fees.

- With the assistance of Scholarships for PhD students from the PVC CST, the units on commercialising science and communicating science were offered in 2002. These units are open to all graduate students, and it is hoped that the generic skills provided through the units will make them increasingly popular in coursework degree programs.

2002-2003 operational plan

- Marketing effort will be made to increase the student enrolment. The Postgraduate Education Loan Scheme will be advertised.

Strategy 3.2: More vigorous marketing of the Faculty's undergraduate and postgraduate degrees overseas, esp. Asia.

Operational Plan: A key area in which the Faculty might increase the breadth of the student base is by recruiting students from overseas. The key market (historically) for Australian universities is Asia. The University has its own marketing arm targeting the Asian market, however the Faculty should also be pro-active in marketing the Science degrees.

Timing: Continuous and immediate.

Responsibility: Prof Hesketh (Dean), Dr Spence (A/Dean, International), Ms Chambers (Faculty office)

Indicators: 20% increase in number of commencing overseas students in 2000 and 2001 over previous year.

Action – review August 2001

- International load has increased from 352 EFTSUs in 1999 to 457 in 2000 and 570 in 2001 (35% and 20% increases respectively).
- The Faculty has participated extensively in international marketing both through high level research contacts with top universities and in collaboration with IO.

2002-2003 operational plan

- Aim to have a small increase in international students, but maintain a high calibre intake.

Strategy 3.3: Attraction of Australian full fee paying students.

[To be monitored after restructuring of BSc degree and introduction of new majors.]

Action – review August 2001

- No action at this stage.

Strategy 3.4: Explore industry-sponsored degrees, or degree components.

[For implementation after Strategies 2.1 and 3.1 are completed.]

Action – review August 2001

- Several degree programs have industry people involved in both the ongoing development of the programs and in teaching them; e.g. Molecular Biotechnology, BCST, BIT, Tropical marine Science Program (also shared with other universities).
- Chemistry, Physics and Computer Science all have “year in industry” programs in operation.

Objective 4: Offer students access to many flexible learning techniques, especially on-line resources.

Strategy 4.1: Provide adequate IT infrastructure

Operational Plan: The use of IT in teaching and learning will increase markedly over the next 5 years. The Faculty needs to work out the expected IT load over the next 5 years and list, quantify and prioritise the resource implications. (e.g. IT-equipped lecture theatres; undergraduate on-line computer facilities; departmental servers; University server and modem pool). An estimate of prioritised need over the next

five years will then be made. A strategy to fulfill these needs will be established, which may include University capital works program, University IT Committee, etc

Timing: Survey completed in first half of 2000. Priority list and plan by end of 2000.

Responsibility: Prof Taylor (A/Dean, Resources)

Indicators: Faculty IT resource inventory. Strategy to increase resources over 5 years. Number of lecture theatres with IT provision, number of computers available to students with Web capability, number of classes/units using IT.

Action – review August 2001

- Several new computer science labs have been built, to expand the capacity of the Carslaw Access Centre (McGrath Lab); Most schools now include computer laboratory replacement as a component of their budgets, and Psychology, Biological science and Geosciences have installed new labs in the last few years;.IT help with infrastructure (through Associate Dean Resources); Teaching grants to help get materials online; UniServe Science help with developing WebCT presence. There is a need for additional support for non-computing teaching equipment which has run down severely in the Faculty, and is no longer a part of the Major Equipment round. The proposed new funding for this purpose will help, and Science aims to be a heavy participator in this.

Strategy 4.2: Develop a consistent and seamless interface for students using Faculty on-line resources.

Operational Plan: The Faculty needs a coherent Web site for teaching and learning resources. The Faculty standard should allow students to navigate around the Departments in a consistent manner, without getting lost, and without having to learn to navigate differently around different locations. The objective that this strategy addresses is to make the Faculty on-line resources easier to use by students. This should lead to more use of the resources, more satisfaction with the Web-site, and ultimately, it is hoped, better student learning. The Faculty standard will be established in consultation with all Departments. The Faculty will not have any input into the *content* of the departmental sites.

Timing: Prototype completed by the end of 2000. All departments conforming by the end of 2001.

Responsibility: Dr Peat (A/Dean, Teaching) and Dr Kable

Indicators: Faculty website that is useful, interactive, and easy to navigate around. Number of hit on key pages, time on-line and any other such indicator.]

Action – review August 2001

- A Faculty Standard was overtaken by the University adopting WebCT.
- Many Units of Study have developed a WebCT presence in 2001.
- UniServe Science has surveyed the presence for first year units (20 units out of 44 have a web presence) and these sites are currently being reviewed by UniServe Science.
- Second and third year units are to be surveyed for a WebCT presence before the end of 2001.

2002-2003 operational plan

- During 2002 the Faculty will promote the development of a WebCT site for the remaining units of study.

Objective 5: Foster the practice of good teaching in the Faculty.

Strategy 5.1: Create a forum where educators can discuss and develop ideas and methods of teaching.

Operational Plan: No researcher can operate maximally in an intellectual vacuum. For scientific research, the School/Department structure serves to provide critical research mass. Educational researchers, however, are spread throughout the Faculty and often do not have well-defined networks. This leads to critical mass not being reached, which in turn does not foster an innovative and vigorous educational research environment. The Faculty will

create a forum where educational researchers can meet and discuss ideas and plans to foster a community of such research. In 1998, members of the Faculty produced 6 refereed papers, 20 conference presentations and received \$330,000 in external (to the Faculty) teaching grants.

Timing: Immediate

Responsibility: Prof Hesketh (Dean), Dr Peat (A/Dean, Teaching)

Indicators: Doubling of educational research outputs based on 1998 levels.

Action – review August 2001

- SCIFER group has been active throughout 2000 and 2001.
 - In 2000 four projects were funded, totalling \$10,500.
 - In 2001 2 projects have been funded so far, totalling \$8,000 with a further two projects under review for funding.
 - Outcomes so far include three papers given at conferences, two journal papers in preparation, and a poster at the VC's Showcase of Scholarly Inquiry

2002-2003 operational plan

- Encourage more collaborative inter-disciplinary research projects.

Strategy 5.2: Maximise staff resources by identifying where replication of subject matter exists.

Operational Plan: The aim for this strategy is to reduce the duplication of teaching material within the Faculty. An outcome will be the freeing up of valuable staff resources, which can be utilised for other teaching innovations. This is the start of a long term strategy. Changing courses, with the problems of pre-requisite material, has to be phased in over several years.

Timing: Identification of curriculum groupings and duplication of subject matter by end of 2000.

Responsibility: Prof Hesketh (Dean), Prof Gillies (pro-Dean) and Dr Denyer (A/Dean, Undergraduate Studies)

Indicators: List of potential teaching resource savings.

Action – review August 2001

- 2001 introduction of 6 integrated Intermediate BMED units taught by combinations of staff from 9 life science departments
- 2001 introduction of MBLG Intermediate units taught jointly by School of Biological Sciences and School of Molecular and Microbial Biosciences
- 2002 introduction of 5 cross-disciplinary majors utilizing existing Senior units
- 2000-2001 Faculty of Agriculture introduces BLandWaterSc utilizing some existing BIOL, GEOL, GEOG and ENVI units from Science

2002-2003 operational plan

- Reduce the number of units of study under offer at the intermediate year.

Strategy 5.3: Continue to require evidence of teaching quality for staff appointments and promotions. Inclusion of education research as a research discipline in its own right.

Operational Plan: Members of the Faculty of Science have met with considerable success in University-wide teaching prizes. Despite this, recognition of good teaching, and those who drive teaching and learning innovation is not as widespread as it might be. There is also a perception that good teachers have more difficulty in being promoted, than do good researchers. A reason for this is that research in education and good teaching are often confused. Educational research, which is

published and disseminated through quality journals and conferences must be recognised as a valid *research* discipline, not just an aspect of teaching. As such, research in educational practice should come under the portfolio of the Faculty Research Committee, and data gathered in the same way as is currently gathered for scientific research. In this way it will become easier to distinguish and recognise contributions to the Faculty by staff engaged in educational research, above the contributions by staff for excellent teaching.

Timing: Immediate and ongoing .

Responsibility: Prof Hesketh (Dean), Prof Field (A/Dean, Research), Dr Peat (A/Dean, Teaching)

Indicators: Successful promotion applications by staff engaged in educational research. Higher profile of educational research throughout the Faculty. Inclusion of “education” as a research discipline.

Action – review August 2001

- From 2001 Faculty requires that all new appointments at Level A, B & C complete the ITL 3-day course on “*Principles and Practice of University Teaching and Learning*”
- Early Career Award available every two years to Level A/B (1996, 1999, 2001)
- Teaching Committee currently developing a proposal for other Faculty teaching awards that might link in with science educational research.
- Encouraged the development of educational research groups within each dept/school. Physics and Biology have such a group.
- Longer-term vision is to consider having a Science Education Unit within the Faculty.
- Faculty has been very successful in securing promotions for staff via the outstanding teaching category, even if research has been rated as less than outstanding.

Appendix

Pathways project in Biological Sciences

Pathways to becoming a professional biologist: empowering first year students

One of the challenges in teaching large first year classes is to be able to show students a pathway ahead for them that will result in their becoming a professional scientist in their chosen discipline area. At the First Year Experience Conference, 2000 - http://www.qut.edu.au/daa/asdu/fye/fye_.htm, it was highlighted that at the first year level, students find it hard to conceptualise their “pathway to professionalism” and do not equate their first year experience of the discipline with the beginnings of their professional journey. This project is an extension of the First Year Experience conference discussions, and proposes a simple program of events, across second semester, that will introduce our current first year biology students to the requirements and milestones of becoming a professional biologist. The program is simple and is made up of a series of activities to articulate some of the avenues open to students and the decisions students will need to make to become a biologist.

The project consists of four lunchtime meetings for students. During these meetings the School will build a picture of how one becomes a professional biologist and what the available employment areas are at the end of the journey. Several years ago a “tree of jobs” was created by the first year staff where job opportunities were located at the ends of branches and the lower branches held jobs advertising for BSc and BSc Hons graduates; the higher branches advertised jobs which needed additional qualifications and experience. To an extent this proposal will build on this heuristic, as it provided students with a powerful mechanism to plan their degree programs. An up-to-date version of the “tree of jobs” will be available for the meetings. In addition web material from “Faces of Science” (<http://science.uniserve.edu.au/faces/>) will be linked to the first year’s Virtual Learning Environment to illustrate some pathways.

Thursday August 23: So you want to be a biologist?

Staff will talk about what it is like to be a biologist and illustrate the diversity of career opportunities. Second and third year students will tell you about their career aspirations and how they believe they will get there.

Thursday September 6: What is research, and how do I get to do it?

This session concentrates on the Honours year, most students’ first real experience of research. Honours students describe how they got to Honours, their research, and what’s in it for them. Staff explain how to get into Honours, how research projects are chosen, and what an Honours student does during the year.

Thursday September 20: Can I really become a postgraduate student?

Postgraduate research students explain their research, what they actually do all day, and why they find it exciting. Staff discuss the different pathways to postgraduate research, and the differences between the various postgraduate degrees.

Thursday October 11: What jobs are there for biologists?

A variety of professional biologists explain what they do in their jobs, why they enjoy working as biologists, and how their undergraduate and postgraduate studies led them there.

*Mary Peat and Sue Franklin
Biological Sciences, F07
The University of Sydney, NSW 2006*

Appendix 2

SCIFER Update, September 2001

Grants awarded

- 2000 - 4 grants - total funded - \$10,500
- 2001 - 2 grants funded total ~\$8000.- 2 grant proposals being rewritten for resubmission

Outcomes from 2000 projects

Refereed conference paper:

New, P., Britton, S., Sharma M. D. & Brew, A (2001) Researching the transferability of mathematical skills, Proceedings of the UniServe Science Annual Workshop (in press)

Conference papers

Cooper, I., Frommer, M., Gordon, S. & Nicholas, J. (2001). University teachers' perceptions of the role of memorising in learning science. Paper presented to the 3rd Annual Change in Education Research Group Symposium (CERG), UTS, February.

Cooper, I., Frommer, M., Gordon, S. & Nicholas, J. (2001). Memorising and understanding in learning - An interdisciplinary study. Paper presented to the 24th Annual Conference of the Mathematics Education Research Group of Australasia, Sydney, July.

Abstracts

Fletcher, P. et al (2000) How tertiary level Physics and Chemistry students learn to conceptualise quantum mechanics. Conference on University Physics Education, 14th National Congress of Australian Institute of Physics, Adelaide University, South Australia, December 10 - 15, 2000.

George, A. et al (2001) Linkages between Biology, Chemistry, Mathematics and Physics at Junior Level. Poster at The Vice-Chancellor's Showcase of Scholarly Inquiry in Teaching and Learning September 27-28 2001

Sharma, M.D., Britton, S., Brew, A. & New, P. (2001) Transferring mathematical skills into physics, AAPT Summer Mtg, Rochester, NY, USA, Announcer, 31 (72)

Sharma, M. D., Brew, A., New, P. & Britton, S. (2001) Do students in the Faculty of Science transfer mathematical skills between subject areas? Poster at VC's Showcase at the University of Sydney, September 2001

Seminars

Fletcher, P. *et al* (2000) Learning Quantum Mechanics Research Project Progress Report, SCIFER Seminar, October 2000.

Frommer, M. *et al* (2000) University teachers' perceptions of the role of memorising in learning science. SCIFER Seminar, February 2001.

Sharma, M. D., Brew, A., New P. & Britton, S. (2000) Developing an instrument for testing the transfer of mathematical skills, SCIFER Seminar, November 2000

Journal articles in preparation

Cooper, I., Frommer, M., Gordon, S. & Nicholas, J. (2001). University teachers' perceptions of the role of memorising in learning science (for HERD).

FACULTY OF SCIENCE STRATEGIC PLAN FOR TEACHING AND LEARNING FOR 2000 - 2004

MISSION: To be a provider of world class *research based* education in science that is valued by the students, their employers, and the general community

Background

The Faculty of Science is located in the College of Sciences and Technology. It is one of the University's largest faculties offering several degree programs: B.Sc., B.Med.Sci., B.C.S.T., B. Psych. and the specially designated B.Sc. degree programs of Advanced, Advanced Mathematics, Bioinformatics, Marine, Environmental, Molecular Biology & Genetics and Nutrition. Jointly with the Faculty of Arts, it offers the Bachelor of Liberal Studies as well as combined degree programs with Commerce, Law, Arts, Education, Engineering and Nursing. Additionally, the Departments² within the Faculty perform a service teaching role for Faculties such as Engineering, Agriculture, Pharmacy, Dentistry and Medicine. The Faculty aims to provide a flexible umbrella to support and promote the teaching of science³ in its widest sense within the University of Sydney, and servicing the needs of employers, professional associations and the Australian community at large.

Strengths and Weaknesses

The size of the Faculty is both its strength and weakness. Degree programs are flexible, which allows students to take a wide variety of subjects and to change between degrees. The Faculty is also able to offer advanced level subjects and degrees, and the Talented Student Program; both of which are widely recognised as strengths of the Faculty's teaching and learning operations.

However, the size of the Faculty means that it can be subject to inertia and be slow to respond to external change. These external demands are likely to continue over the foreseeable future – mostly acting to increase pressure on the Faculty and its staff (insecure funding, poorer HSC preparation and higher expectations).

Challenges and Opportunities

The biggest challenges facing the Faculty during the 2000-2004 period are to be able to respond and adapt to changing demands in a timely fashion. The Faculty is also faced with increasingly complex accommodation issues including ageing buildings, inadequate space, and an inability to house coherent large disciplines together. Space and accommodation restrict the opportunities to respond to changing demand in some areas of the Faculty.

This strategic plan for teaching and learning is focussed on 5 specific opportunities and weaknesses. However, there is an implicit Objective 0 contained in the Plan, which is "to continue to support and develop teaching initiatives which the Faculty does well, and for which it is well-known". These include the Advanced and TSP programs, Honours and post-graduate research training, and many of the speciality degrees.

Objective 1: Offer students a positive total experience, leading them to feel part of the university community.

The change from school to university is one of the biggest dislocations that a student will experience in their lives. They emerge from 12-13 years of a structured and supervised environment to one where the responsibility for learning is now owned by the students themselves. Additionally, the multi-cultural nature of Australian society and the larger number of overseas students means that the experience will be different for each student. In 2000, the Faculty enrolled 1178 new students. At census date, 110 students had discontinued their enrolment (10% of the class). There are no hard data on reasons for this high drop-out rate, however, anecdotal evidence suggests that many students are overwhelmed by the university experience. For students to learn to the best of their ability, they must settle quickly into university life, and feel part of the community for the whole time they are at university. This Faculty objective is aligned with the University Objective 1, particularly strategies 2 and 4, which deal with the school-university transition and the First Year experience.

² "Departments" in the context of this document always means "Schools and Departments".

³ The meaning of the word "science" in this document should not be confined to traditional or laboratory-based disciplines. Rather, the word is used to include all disciplines that fall under the umbrella of the Faculty of Science as it currently stands, including mathematics, computer science, psychology, and all the laboratory-based disciplines.

Strategies:

- 1.1: Explicitly ease students through transition to university [*Indicators:* Early drop-out rate halved to 5% over 5 years].
- 1.2: Have each student identify with a cohort of peers who can provide mutual support in study and life [*Indicators:* CEQ data⁴ on “Overall Satisfaction”. On-time completion statistics].
- 1.3: Have processes that help each student identify with a group across years having similar academic interests [*Indicators:* Membership of student academic or alumni societies. Targeted donations]
- 1.4: Have each unit make goals and relevance clear. [*Indicators:* CEQ data on “Clear Goals”].

Objective 2: Establish links between degree outcomes and employer needs

After taking an undergraduate science degree at the University of Sydney, many students will immediately undertake a higher degree. Most students, however, enter the work force. The careers that our students will embark upon is highly varied, including professional careers (e.g. B.Psych.), scientific careers (B.Sc., etc), general community service (public service, police force, etc), legal (B.Sc./LLB) and many others. Except in some specialist areas (such as Psychology) and through some departmental organisations (such as the Basser Foundation in the Department of Computer Science), we do not know the primary destination of our graduates in any quantitative measure. This represents an obstacle to our understanding of the quality of our degrees (and graduates) from the external perspective. As a result, we cannot target the largest employer groups of our graduates to find out whether the Sydney University science degree is providing the skills and knowledge that they require.

The Faculty will survey graduates to find out their field of employment. A specific use of the data that is to be collected will be to target the major science employer groups to identify weaknesses in the training of our graduates (either discipline-specific or generic) and for these employer groups to provide input as to how this can be improved. This Faculty objective is strongly in line with Objective 3 of the University T&L Plan, particularly strategies 2, 3 and 4. Strategy 2 aims to gather graduate evaluation of courses, strategy 3 seeks to include employer input into course development, while strategy 4 aims to develop a set of generic and faculty-specific skills to interweave into degree programs.

Strategies:

- 2.1: Know the primary destination of our graduates. [*Indicators:* Establishment of a graduate destination database. Extent of coverage of this database.]
- 2.2: Have employers review and advise on curriculum. [*Indicators:* Employer satisfaction, employer input on new courses, GCCA data on graduate outcomes (employment, salary, etc).]

Objective 3: Broaden our student base to broaden our funding base

Future government funding of universities appears uncertain. The Faculty has been very successful in attracting high quality, government funded, undergraduate students into its programs. The development of these innovative degree programs needs to continue. However, the Faculty also needs to explore ways of reaching more students with sources of funds outside the normal government-funded undergraduate places. There are 3 principle opportunities – overseas students, fee-paying local students, and value-added post-graduate courses. In 1999, 10% of the total Faculty EFTSU were non-HECS places. The Faculty needs to be actively working on increasing this percentage through all three channels with the aim of reaching 20% of the incoming 2005 class as non-HECS students. Additionally, the possibility of any of our undergraduate or post-graduate degrees being sponsored by interested industrial or professional bodies should be explored.

Strategies:

⁴ The CEQ was implemented for the first time in 1999. It is not possible at the present time to quantify the improvement in CEQ statistics that the Faculty would like to achieve. These statistics will, however, be used to monitor objectives.

- 3.1: Develop a flexible post-graduate “generic” structure to facilitate easy mounting of “valued-added”, fee-paying courses, e.g. certificates, diplomas, and coursework masters degrees. [*Indicators:* Enrolment in fee-paying post-graduate (non-research) courses doubling from 1999 level by 2005]
- 3.2: More vigorous marketing of the Faculty’s undergraduate and postgraduate degrees overseas, esp. Asia. [*Indicators:* Doubling of number of international students by 2005, based on 1999 level].
- 3.3: Attraction of Australian full fee paying students. [*Indicators:* Number of local full-fee paying students]
- 3.4: Explore industry-sponsored degrees, or components. [*Indicators:* Sponsorship of post-grad courses]

Overall indicator: The performance of all four strategies as a whole can be monitored as the fraction of EFTSU that are externally (non-HECS) funded. This is currently 10% (500 EFTSU). The aim is to reach 20% of incoming EFTSU to be non-HECS funded by 2005. This requires an average ~20% per year increase.

Objective 4: Offer students access to many flexible learning techniques, especially on-line resources.

The development of information technology, and the readily availability of computers and on-line access has opened up a new frontier in flexible delivery of teaching materials and flexible learning styles of students. While recognising that the “Web” is not a panacea for all flexible learning needs, it is an area that is being demanded by students and one that, in general, the Faculty has not kept up with. (However, there are some shining examples within particular Schools and Departments where this generalisation is not true). This objective is therefore focused at one aspect of flexible learning: the development of a coordinated Faculty-wide approach to IT and its delivery.

This Faculty objective is embodied in the University’s Objective 5, particularly strategy 1 which aims “to provide significant investment in information technology enhancements and improve student access to IT”. The Faculty should endeavour to play a lead role in the direction these improvements take. This IT plan is also included partially in the University Objective 2, strategy 3, which is to collaborate with other institutions in the development of IT resources.

Strategies:

- 4.1: Provide adequate IT infrastructure [*Indicators:* All lecture theatres with IT provision. Number of computers available to students with Web capability. Number of classes/units using IT.]
- 4.2: Develop a consistent and seamless interface for students using Faculty on-line resources, [*Indicators:* Faculty website that is useful, interactive, and easy to navigate around. Number of hits on key pages, time on-line and any other such indicator.]
- 4.3: Encourage staff to research the role of IT in teaching and learning, and flexible learning in general. [*Indicators:* Publications on flexible teaching and learning and the role of IT]

Objective 5: Foster the practice of good teaching within the Faculty.

The Faculty of Science has a strong interest and demonstrated performance in teaching innovation. For several years the Faculty has had its own Teaching Development Grant scheme and a Teaching Award for new lecturers. It has an active Teaching Committee and a strong teaching portfolio, including external teaching grants and publications in educational research. The structure of the Faculty, however, means that these educational innovators are aligned with their scientific research disciplines, which inhibits cross-fertilization of educational ideas across the Faculty.

The most valuable resource that a Faculty has is its staff. Enthusiastic staff who are inspiring teachers will make up for almost any deficiency. However, stress induced from rapid change and increased teaching loads reduces enthusiasm and creates a culture where change is resisted. The Faculty must devise ways to maximise the effectiveness of its teaching, and all new initiatives must be undertaken with an eye on the available resources.

Finally, the contribution of innovative educators to the performance and success of the Faculty must continue to be recognised. Teaching performance, or the promise of teaching ability, must continue to have a high profile in academic appointments and promotions. The field of educational research must be recognised as a valid research field in its own right.

This Faculty initiative is embodied in several of the University's objectives, including Objective 2, Strategy 2 ("recognition and incentive schemes for teaching"), most of Objective 4 ("foster an environment where quality and innovation in T&L are valued..."), and also most of Objective 6, ("to attract, develop and reward well-qualified staff with a strong commitment to teaching").

Strategies:

5.1: Create a forum where educators can discuss and develop ideas and methods of teaching to enhance the quality of student learning Faculty-wide. [*Indicators:* Establishment of such a forum; better communication of teaching methods across the Faculty. Increase in educational research output, including papers, grants and conference presentations.]

5.2: Maximise staff resources by identifying where replication of subject matter exists and to reduce such duplication. [*Indicators:* No further increase in average teaching loads across the Faculty.]

5.3: Continue to require evidence of teaching quality for staff appointments and promotions. Educational research, publications and grants must be considered as a valid research discipline. [*Indicators:* Successful promotion applications by staff whose research interest includes educational research.]

Fig 1: Relationship between the five Faculty objectives and generic teaching performance indicators

INDICATOR	INDICATOR	OBJECTIVE
<ul style="list-style-type: none"> • Progression rate • 1st to 2nd year retention • CEQ, Good Teaching • CEQ, Generic skills • CEQ, Overall satisfaction • GCCA, Good Teaching • GCCA, Generic Skills • CGGA, Overall satisfaction • CGGA, Full-time employm • GCCA, Further Study 	<ul style="list-style-type: none"> • Progression rate • 1st to 2nd year retention • CEQ, Good Teaching • CEQ, Generic skills • CEQ, Overall satisfaction • GCCA, Good Teaching • GCCA, Generic Skills • CGGA, Overall satisfaction • CGGA, Full-time employm't • GCCA, Further Study 	<ul style="list-style-type: none"> • 1. Positive experience • 2. Link to employers • 3. Broaden student base • 4. Flexible learning • 5. Foster good teaching
		<p>OBJECTIVE</p> <ul style="list-style-type: none"> • 1. Positive experience • 2. Link to employers • 3. Broaden student base • 4. Flexible learning • 5. Foster good teaching