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17 December, 2003.

Associate Professor Don Taylor,
Acting Dean, Faculty of Science.

SciFER ANNUAL REPORT, 2003.

This year the Science Faculty Education Research Group (SciFER) continued its program of lunchtime seminars, with eleven presentations on different aspects of tertiary science teaching and learning. Most seminars related to recent Teaching Development Grants or Teaching Improvement Fund Grants, but also included an invited presentation on methodological issues in science education research (given by Dr Sue Gordon, Mathematics Learning Centre), which attracted a large audience from within the university and from outside. A copy of the 2003 program is attached for your information.

The 2003 round of SciFER grants produced only one application for funding, which was, in the end, not approved by the committee formed to consider the grant applications. (I anticipate that an amended form of this application will be re-submitted in the next advertised round.) The low response rate indicates a possible difficulty with the guideline that requires projects to involve more than one Science School or Department. For that reason, I requested (verbally) a few months ago that you consider approving an amendment to the SciFER grant guidelines so that education research projects undertaken in a single Science School or Department could also be eligible. Thank you for agreeing to this request. At the same meeting you kindly agreed to my advertising another round of funding early in 2004, using the amended guidelines. I intend to invite new applications for SciFER projects in late January or early February, with a closing date of March 31, 2004.

For your information, I have enclosed reports on the five previously funded SciFER projects which were listed as "not yet complete" in the SciFER Annual Report of 2002. Of these five, projects numbered 2000:4, 2001:1 and 2001:2 are either now complete or are progressing satisfactorily. I draw your attention to projects 2001:3 and 2001:4. The leader of both projects, Dr Rosanne Quinnell (School of Biological Sciences), has reported that because of increased teaching commitments she has been unable to make progress on these projects this year.

For project 2001:3, data was collected some time ago and is awaiting analysis. Funds remain available for this purpose. Dr Quinnell has undertaken to complete this work and to write a final report on the project by the end of 2004.

In the case of project 2001:4, essentially no work has been completed since the time it was approved. It appears that proposed changes in the plant physiology courses have removed the rationale for the project. No funds have yet been expended. With the agreement of Dr Quinnell, I recommend that project 2001:4 be terminated and that all grant money be returned to the Faculty. I will contact Helen Kwan to arrange for the return of funds.

To ensure that SciFER continues to prosper, I believe the coordination duties should rotate amongst its participants. After two years, I feel the time is right to hand over to a new coordinator and will email the SciFER membership in late January to ask for expressions of interest. I know there are at least two or three members who would be prepared to take on the role. I will let you know the outcome and obtain your prior approval of the new coordinator.

We are very grateful for your interest and support this year, not only as Acting Dean but also as a presenter of a SciFER seminar. I would also like to acknowledge the administrative help provided by UniServe Science at different times during the year.

Yours sincerely,

Jenny Henderson
SciFER Coordinator

cc: A/Prof Mary Peat (UniServe Science)

encl: Reports on SciFER projects previously listed as "not yet complete"
SciFER Program for 2003

PROGRESS REPORTS ON PROJECTS PREVIOUSLY LISTED AS “NOT YET COMPLETE”.

2000 PROJECTS

GRANT 2000:4 Instrument for Testing Transferability of Mathematical Skills (\$3500, Sandra Britton/Manjula Sharma)

Project now completed successfully. All funds have been expended. In addition to the previously notified papers, posters and conference presentations, a journal article has also been submitted.

2001 PROJECTS

GRANT 2001:1 First Year Student Experiences in Physics and Biology: The HSC Syllabus Changeover (\$5000, Chris Stewart/Manjula Sharma)

All funds have been expended. Project has been successfully completed as a SciFER project. Data collection and analysis will continue within the Schools of Physics and Biological Sciences in future years and is likely to result in future publications in addition to those already listed in last year's report.

GRANT 2001:2 Learning from Feedback (\$2965, Charlotte Taylor/Meloni Muir)

The Project Leader, Dr Charlotte Taylor, has submitted the following progress report:

Background

The aim of this pilot project was to investigate the way in which students use feedback on written work and learn from the process, by

- carrying out a survey of student perceptions, understanding and subsequent use of feedback comments on their writing*
- using information from this questionnaire to create interview questions for individual students about details of interpreting and using feedback*
- using these data to create interview questions for staff who were involved in marking and giving feedback*

This project was deferred for a year due to Charlotte Taylor going on study leave and again when Cyril Latimer retired from Psychology. At the beginning of 2003 a change to the project was submitted to the Human Ethics Committee to include the students and staff of the School of Physiology in the project. This meant that we could explore changes in student perceptions of feedback as they progressed through their degree program and obtain information on perceptions of first year writing from a different perspective. All students in Physiology had studied in first year biology. Because of the arrangement of course timetables most data could only be collected

towards the end of semester 2 this year, and analysis and reporting will be continuing into 2004. A complete review of the budget therefore cannot be given here.

Methods and results

A questionnaire was administered to all first year students in BIOL 1003 (n=900) and a questionnaire given the Physiology students (n=20) at the end of semester 2. Individual student volunteers were interviewed at the end of semester 2 after they had received their marked report. Data entry and interview transcription are in progress now and analysis will be completed in January 2004. The following qualitative information is available from the questionnaires.

Students generally understand what is expected of them for the written assignments and found the lab session for personalised feedback on draft reports useful. They usually understood and agreed with the feedback comments provided by markers and would use the feedback when writing future assignments. These findings provide a more positive picture of the writing and reflection process than previously documented (Robinson and Blair 1995, Trigwell and Prosser 1997) and indicate a relatively successful level of communication between students and staff (Lea 1999). However students were less positive about their progress in writing as a result of the feedback and revision processes, indicating that they cannot necessarily identify the areas where they have most problems with writing nor identify their strengths in writing. This indicates a disjunction between the expectations of the program in enhancing independent learning, and students' apparent perceptions of their level of independence in learning academic writing (Lea and Street 1998, Fazey and Fazey 2001).

The responses are now being further analysed to provide quantitative data and to include the answers to open ended questions. The latter are being analysed using a modified phenomenographic procedure (Prosser and Trigwell 1998) so that correlation analyses and regression analyses can be carried out to answer the following questions:

- Are students' perceptions of the difficulty of writing related to their perceptions of the efficacy of feedback?
- What are the relationships between confidence in writing, perceptions of difficulties, appreciation of strengths, and level of independent learning using feedback exhibited?

We will also be making comparisons with data collected in 2 related studies, with other cohorts of first year students, to integrate information about attitudes to writing on entry to university (Taylor and Drury 2004) and links between conceptions of writing and performance (Ellis, Taylor and Drury, in prep).

Although the sample size for Physiology students is very small (n=20) similar trends can be seen in some aspects of writing and using feedback. The level of independent learning during the writing process does not seem to have changed between first and second year, and students still seem to be experiencing similar difficulties with writing. Interviews with staff in this course may provide more information about progress in writing in relation to the increased levels of expectation for writing and understanding of discipline content.

Interviews with students and staff have provided information on individual differences in perceptions of expectations of writing, problem areas in writing, communicating about problems and creating new understanding of writing problems so that solutions can be effected.

Outcomes

1 Responses from the first year questionnaire, and from the interviews, highlighted a number of problems with feedback and these problem areas are the focus of similar attention in a number of other disciplines (Rust et al 2003, Storch and Tapper 2000, Akerlind and Jenkins 1998, Kuisma 1999). Key areas for immediate effort in curriculum development are

- standardising marking and feedback procedures to address equity and learning issues

- *addressing disjunctions between markers' understanding of the features of good writing and their communication of this to students when writing feedback.*
- 2 *Using these data a website is being developed in 2004 for first year students and staff to explain expectations of writing and assessment, provide models of assessment criteria and how marks are allocated and to explain the most effective use of feedback both from a student and staff perspective.*
 - 3 *We will publish our findings in at least one paper for submission to the journal Assessment and Evaluation in Higher Education and, exam marking permitting, also present them at the HERDSA conference in July 2004.*
 - 4 *We plan to build on the findings of three pilot studies, namely Prior experience and attitudes to writing (Taylor and Drury), Learning biology through writing (Ellis, Taylor and Drury) and Interpreting and using feedback (Taylor and Muir) to develop a new study of Improving student learning through writing in science. We are applying for Sesqui funding for the project in 2004.*

References

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- Prosser, M., & Trigwell, K. (1999). Understanding learning and teaching: the experience in higher education. Buckingham: Society for Research into Higher Education and Open University Press.*
- Rust C , Price M and O'Donovan B (2003) Improving students' learning by developing their understanding of assessment criteria and processes Assessment and Evaluation in Higher Education 28(2) 147-164*
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- Taylor, C.E. and Drury, H. (2004). The effect of student prior experience, attitudes and expectations on performance in an undergraduate science writing In: G. Rijlaarsdam , H. van der Beerg, M Cousins Eds. 'Effective Teaching and Learning of Writing' - Studies in Writing 17 435-451 Amsterdam: Kluwer Academic Publishers.*
- Trigwell, K., & Prosser, M. (1997). Towards an understanding of individual acts of teaching and learning. Higher Education Research and Development, 16 (2), 241-252.*

GRANT 2001:3 The Role and Usage of Computer-Based Learning Modules in Supporting Student Learning across Life Sciences Disciplines

(\$5000, Rosanne Quinnell/Elizabeth May)

No further work was done on this project during 2003. Data was collected in 2002 and awaits analysis by the project team. The Project Leader, Dr Rosanne Quinnell, has undertaken to complete the analysis and write a final report by the end of 2004. She has forwarded the following update:

Project update, 2003

Project team leaders: *Drs Rosanne Quinnell and Elizabeth May, School of Biological Sciences*

Project team: *Dr Rosanne Quinnell, School of Biological Sciences*
Dr Elizabeth May, School of Biological Sciences
Dr Hilary Lloyd, Department of Pharmacology
Dr Sue Franklin, School of Biological Sciences

Background The use of computer-based learning modules (CBLMs) is not new within the Faculty of Science. In particular in the Life Sciences, the use of computer-based materials as simulations, lab-based experiments, replacement tutorials or as self-assessment support has been a part of our students' lives for nearly a decade. The primary focus of this research is not on the individual resources as effective learning tools, but on the **perceptions of both students and staff** as to the importance of individual modules in the overall teaching and learning process, as advocated by Prosser (2000).

Updated time line summary:

| | | | Update Dec '02 | Update Dec '03 |
|------|-------------------|--|----------------------------|-------------------------------|
| 2001 | Nov | Finalise survey instrument, submit ethics approval | √ | √ |
| 2002 | Jan-Feb & Oct-Nov | Design questions for focus groups and conduct focus groups and interviews. | This has been put on hold. | This is still on hold. |
| | | Implement survey, enter data, conduct initial analysis | √ | √ |
| 2003 | Jan-Feb | Correlate student results with survey responses | still to do | still to do |
| | Mar-June | Prepare data for manuscripts and other modes of dissemination. | still to do | still to do |

Additional comments: Despite the team's commitment to this project we have not progressed as far as we would have liked. This is because the staff profile of the School of Biological Sciences has changed resulting in key members of this team taking on more teaching and associated administration with the School.

We expect to be able to undertake a comprehensive analysis of the data collected across the disciplines surveyed and will be able to commence the dissemination of our findings by the end of 2004.

Yours sincerely,

Rosanne Quinnell
 School of Biological Sciences
 Faculty of Science

GRANT 2001:4 How do Students in a Science Degree Gain Skills in Interpreting and Understanding the Mathematical Relationships in Quantitative Data?

(\$2000, Rosanne Quinnell)

No work was done on this project during 2003. It appears that proposed changes to the Plant Physiology courses will remove the rationale for the project. The Project Leader, Dr Rosanne Quinnell, has agreed that the project be terminated and that all funds be returned to the Faculty. She has forwarded the following update:

PROJECT UPDATE, 2003

Aims:

The aim of this study is to identify how different disciplines within the Faculty of Science teach students an understanding of the processes of data collection, data analysis and communication of scientific results.

Project team leader: Rosanne Quinnell School of Biological Sciences

Project team: Manjula Sharma, Irene Schneider, Peter New & John O'Byrne

Updated time line of project:

| | | | <u>Update Dec '02</u> | <u>Update Dec '03</u> |
|------|------------|--|--|---------------------------|
| 2002 | Jan - Feb | Design audit criteria for teaching and assessment material for the above units of study. | Completed in May/June '02 | Completed in May/June '02 |
| | Mar - June | Audit teaching and assessment material from 2001 units of study. | Not yet done, move back 12 months | *changed circumstances |
| | July - Oct | Analysis of the audit data | Not yet done, move back 12 months | |
| | Oct - | Prepare a report | Interim report here, final report move back 12+ months | |
| | Nov- | Present report to SciFER group | Not yet done, move back 12+ months | |
| 2003 | Jan - Feb | Prepare manuscripts for dissemination. | Not yet done, move back 12+ months | |

Additional comments: *Despite the team's commitment to this project we have not progressed as far as we would have liked. This is because the staff profile of the School of Biological Sciences has changed, resulting in team leader taking on more teaching and associated administration. Note also that the Plant Science curriculum is under construction. The new curriculum, to be taught across the Faculty of Science and Faculty of Agriculture, Food and Natural Resources, will mean the design of new teaching and learning resources.*

**These curriculum changes are mooted to be introduced in 2005 so in the short-term it will no longer be possible to evaluate Plant Physiology teaching and learning resources with regard to:*

- *Where and how we explicitly teach/train students to do unit conversions?*
- *Whether we are explicit about the link between symbols and their physical/scientific meaning?*
- *Where and how we train students to present data appropriately eg to draw graphs, reading and interpreting slopes and intercepts?*

Because of the changes in Plant Science teaching, I think that it would be better for one of the team members take over as leader, or we wind-up the project early next year.

Rosanne Quinnell, School of Biological Sciences