



Integrating Feedforward on Academic Writing into an Undergraduate Science Course

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OVERVIEW

This case study describes a major initiative in providing feedback to students engaged in writing activities in a first year science unit. The *Writing in Biology* program has provided interesting challenges, mainly associated with the large number of students and staff involved (n=1000 and 50 respectively). We have however persisted in this endeavour since we consider writing an essential component of the undergraduate curriculum, which must be integral to learning from the beginning of the degree program.

Activities include a series of opportunities for practicing writing, individual face-to-face feedback sessions for all students, and an online discussion forum during the writing process. Students and staff have actively engaged with the activities, and evaluations have consistently indicated enthusiasm for more practice and feedback opportunities. We have also incorporated a series of educational research projects into this program so that we can better understand how students learn while writing.

INFORMATION ABOUT THE CLASS, MODULE OR PROGRAMME

This initiative was designed for a first year biology unit in the Faculty of Science at the University of Sydney, Australia. The unit is taught for 13 weeks in first semester and most students have arrived at the university directly from high school. While most students in the unit will be studying for the Bachelor of Science degree, with many at the advanced level, a significant proportion will be enrolled in degrees in other faculties e.g. Agriculture, Veterinary Science, Arts, Education, Engineering, Pharmacy, for which first year biology may be a compulsory subject. The number of students in the unit has varied over the past 10 years ranging from a minimum enrolment of 850 to a maximum of 1600.

DESCRIPTION OF THE CASE

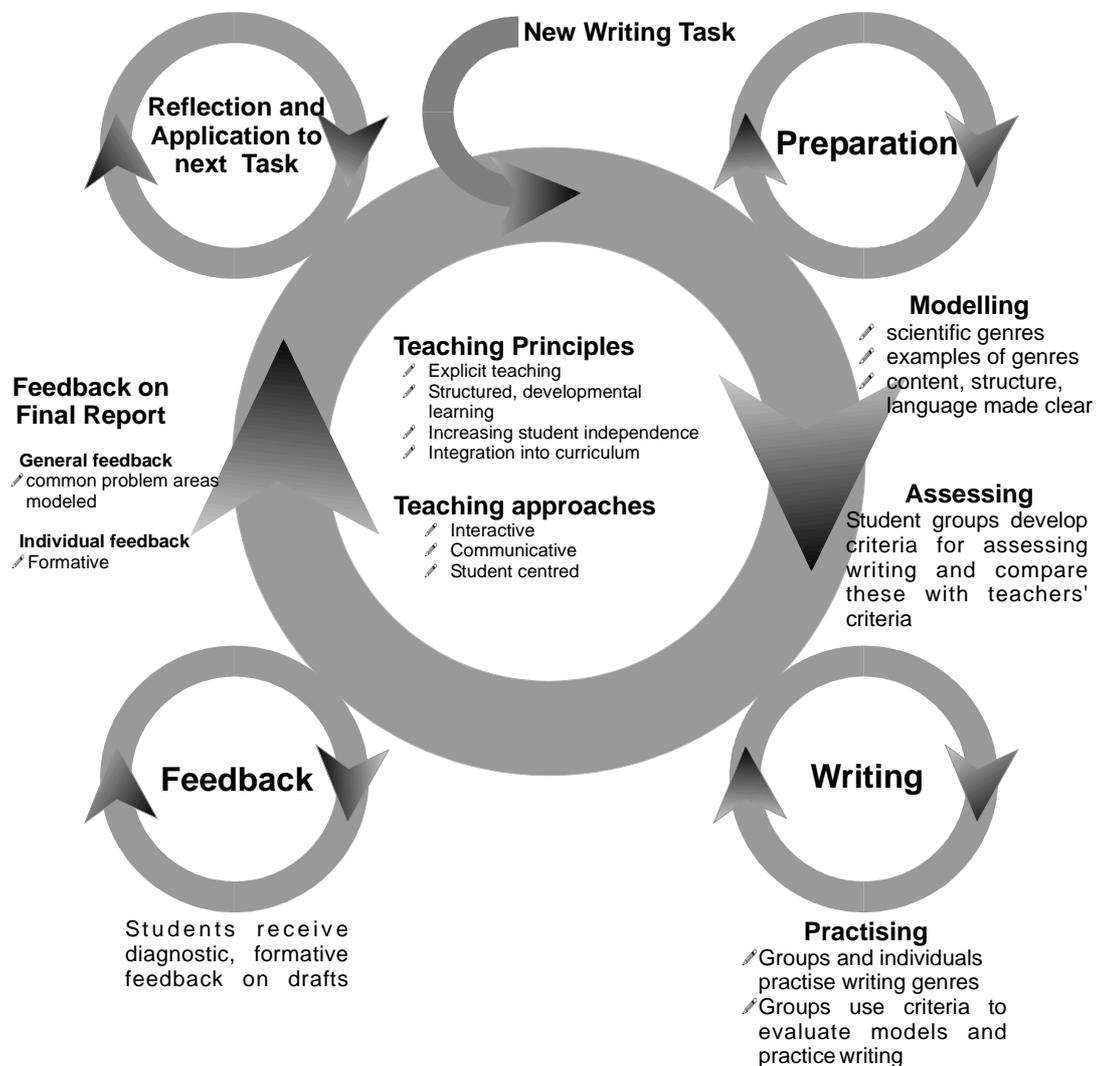
The Writing in Biology program was integrated into the first year Biology curriculum in 1994 to raise awareness, and engage students in academic writing within the science curriculum (Drury and Taylor, 1996). The program cycle is shown below in Figure 1, and a key component is a series of opportunities for students to obtain feedback on their writing. Feedback is provided in a number of forms which necessarily encourage self appraisal and independent learning in a large cohort, where individual attention from staff is less likely to be available (Nicol et al, 1994). Students are introduced to the cycle of learning and feedback at the onset of the unit and become engaged in writing activities during each weekly practical class. This signals to student the value placed on writing within the



discipline, something not always appreciated by students choosing to study science (Moore, 1993; Lea and Street, 1998). All writing activities are conducted during the laboratory classes, where there is more time for group activities and discussion sessions with demonstrating staff. Lectures are used for more information-related sessions with the whole cohort. Online resources are provided to help with report writing and tips on using feedback (Drury, 1997).

The feedback cycle begins with student-centred activities in week 2, identifying aspects of good and poor writing and incorporating these into a list of criteria for assessing writing. Students then use data from a laboratory class to prepare a practice report. This is reviewed by peers in week 3 using the criteria previously identified. Preparation of the practice report is rewarded with marks towards the final grade, and all feedback is for formative purposes. Students then embark on preparation of a more substantial report based on a new lab experiment.

Figure 1: The Writing in Biology Learning cycle in first-year biology at Sydney University (Taylor and Drury, 2004)



To help in integrating information and ideas we offer further help in two forms, appropriate to the cohort size. A lecture is offered in week 6 for all students, at which we discuss aspects of report writing and using the primary literature. An online forum for further discussion and feedback is also available to all students, and moderated by the unit



coordinator. This has been in place since 2000 and initially used the *Webteach* program (Hughes and Hewson, UNSW), before subsequently moving to the university default - WebCT, which provides an asynchronous mediated forum for discussion and questions.

The program provides:

- Access to a 'seminar room' where a series of discussions are initiated by the moderator, based on suggestions sent in by students.
- Access to the seminar for all students enrolled in the course for a 3 week period (weeks 6-8), during which they will prepare a draft report, submit the draft to staff for feedback, and make revisions before submitting a final report.
- Opportunity for students to participate in the discussions and ask questions using their name, or an alias if they prefer.
- No obligation to access the program, or participate in discussions, as part of course assessment.

The moderator has access to a detailed log of visitors, participants, and movements around the site, plus a permanent record of all discussions, which has provided valuable information and analysis of learning activities associated with the writing process (Taylor, 2002).

At this point in the cycle it is important to signal to students the importance of using feedback in context while writing. Initially in the program students prepared this report for summative assessment, and could approach staff for feedback during the writing process. This rarely happened mainly because students left the writing process until the last minute. After evaluations of the writing program we decided to add in further feedback sessions in week 7 to encourage students to reflect on their writing during the process. A decision was taken to spend one entire lab session giving students feedback on a draft report - a significant curriculum change given the size of the cohort at the time (n = 1200 students and up to 50 demonstrating staff). Each student has time (albeit only about 10 minutes) with a member of staff to talk about their completed draft report and get help on how to improve the final report. A feedback sheet is completed by each student for submission with their draft report. This has a series of questions, most of which the students complete as a self-appraisal exercise. They deal with areas for the report such as

- Following instructions on presentation e.g. font, sections of the report, presenting data
- Creating a reference list and citing references in the text
- Putting information in the correct sections

These aspects are seen as being technical points which students should be able to address using the notes and information provided on the feedback and marking sheets. The staff can then focus on discussing with the student how to improve aspects such as

- Interpretation of results
- Limitations of the experimental methodology
- Integrating results with those reported in the literature
- Suggestions for further work

These areas require a more sophisticated approach to writing, particularly in integrating information from the literature, and creating a cohesive and persuasive argument.

Teachers do not write on the report - but may indicate areas for attention on the feedback sheet. Thus all students have the same type of feedback. They are also directed to make use of the detailed marking criteria sheet which is provided in their manual.



Students are given further marks towards the final grade, based on their participation in the feedback session, and have a week to make changes based on the feedback, before submitting a final report. At the same time staff who will be marking reports attend training sessions to discuss providing standardized marking and feedback for the final reports. Marks are allocated for submission of the draft report (approx 3%) and a further 15 % for the final report. The vast majority of students submit a completed draft report and we now have no problems with late submissions of final reports (although we know that some students make no changes and submit the draft for the final report).

RATIONALE IN TERMS OF EDUCATIONAL IDEAS

The focus on writing to learn has influenced many similar programs and has been documented in the field of biology (Robinson and Blair 1998, Moore 1992). In terms of the product and process of writing we wanted to achieve in the program, the concepts of genre writing and apprenticeship in academic writing, needed to be incorporated into the curriculum to provide a progression from those genres students have been exposed to in school (Keys, 1999; Lea and Street, 1998). In practice this required acknowledgment, within the program design, of approaches to learning and individual differences, as well as creating student-focussed environments which encouraged and nurture independence at a holistic level (Prosser and Trigwell, 1999; Biggs, 1987; Ramsden, 2002). Such a focus on learning, and the student as an autonomous unit, is mirrored in teaching/learning research and practice, such as adult learning (Brookfield, 1986). The cycle in our program provides a structure and progression which seeks to enhance depth in learning through the processes of organising the learning activities and encouraging practice, reflection and revisiting (Lavoie, 1999). We also acknowledge the value of feedback as a learning tool by moving most feedback opportunities into the period before the report is finally submitted. The structured approach can also be used expediently to accommodate the practicalities of working with a large cohort of students and staff, to maintain the quality of the experience and effect maximum benefit for all students.

Having established, and evaluated the program (see section below) it became obvious that many aspects of student writing required a better understanding if we were to effectively help our diverse student learners. We therefore conducted a series of research projects based around the concept of *Learning through Writing*, to identify how students learnt during their writing experiences. These provided important information about prior experiences of student writers and their approaches and conceptions of writing (Taylor and Drury, 2004; Ellis at el, 2005; 2006 in press). We are also conducting studies into the way in which students use the feedback provided (Taylor, 2006) which involve analysing student draft, and final, reports to determine in what way changes are made. The Copyfind plagiarism software¹ can be used to highlight the extent and areas of change. We are also matching these areas of change to the types of feedback given by staff to determine what type of feedback is most useful for students. Our findings are therefore informing further developments of the program to improve the specific types of feedback given by staff and to train staff in effective marking.

EVALUATION

Extensive evaluations of the feedback session over the past 5 years have shown that students value the exercise, and most make changes to their draft as a result of the feed-forward process. It is not clear to what extent their marks improve but students indicate overwhelmingly positive outcomes for the following:

¹ <http://plagiarism.phys.virginia.edu/software.html>



- Understood better what was expected
- Understood feedback and agreed with feedback
- Had increased confidence after experience
- Will use feedback in next assignment

Some problems occur, particularly with such a large cohort, in that the extent and quality of feedback varies between different staff. To address this students are encouraged to seek further feedback from first year staff if they feel disadvantaged. Similarly there are some problems where students address points made by one teacher only to be penalized by another who applies the criteria differently - these are relatively rare but provide a negative experience for students. We have further enhanced staff training to try and address the issue of standardised marking and feedback.

A qualitative survey about the online discussion forum (n= 200 students) showed that the majority used the online seminar at home and were generally happy with access and with navigating the site. Ninety five percent of those visiting the forum used information from the discussions in their reports. There were distinct peaks of use during each 24 hour period, including a series of smaller ones associated with accessing during the day while on campus, plus an increase in use as the evening progressed. Students commonly logged on late in the evening, while they were working on their report, and a subset remained active between 12am until 3am.

Approximately 10% of the students accessing the site participated in the discussions, a figure which compares very favourably with other studies, particularly since participation was not obligatory (Lea (2001)). Reasons for participating included: *“Getting personal attention for my question”, “helped me get started”, “Can ask questions and get answers any time”, “Read the answers while I’m writing my report”.*

Overall the following advantages for the online initiative were identified:

- Easy to access and navigate for students and moderator
- Design of the discussion mode in Webteach makes students read through, and engage with, each discussion as it develops. Not quite so ordered in WebCT?
- Students become aware that other students have the same problems
- Develops a permanent “question pool” for the cohort of students - not transitory as in tutorials
- Useful for those who are shy or lurkers - can still be part of the process
- *“Helps me to understand through discussing”*
- Moderator can help individuals while being accessible to all students, providing equal access to all students

However some less positive aspects are identified:

- Time consuming to moderate, since it runs in addition to face-to-face teaching
- Perhaps not enough participants to generate questions and ongoing discussion?
- Answers not always available quickly enough

Teaching staff were provided with transcripts of discussions to show where students tended to have problems with report writing, so that the teaching team could focus attention on those areas. We think that a decline in visits to the discussions over the past few years is probably due to the fact that we have addressed many of these problems.



PLANS FOR FUTHER DEVELOPMENT

Changes are made each year following evaluation of the writing and feedback program (Peat et al, 2005). Ongoing analysis of student use of the online discussion forum, and use of feedback in general, indicates where we should direct more effort and where to improve communication with students. Our major efforts are now focused on enhancing student independence and confidence, since these are most likely to improve writing as students progress through their degree program.

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