

# Feedback assessment of Science report writing for first year Genetics students

Tania Blanksby and Chee Kai Chan, Department of Genetics, La Trobe University, Australia  
T.Blanksby@latrobe.edu.au

## Introduction

Many first year university students undertaking Science as a degree bring with them a range of different skills and competencies in scientific report writing. Some have had extensive training in this area during their secondary education. However, others have depended on doing well in multiple choice examinations to get them through. In the Genetics first year course at La Trobe University, there are an increasing number of both local and overseas students who have English as their second language, and who struggle with the preparation and submission of an adequate science report. Some of the students carry this handicap with them into their second and third year.

Efforts to help university students master the skills of scientific report writing have shown the importance of providing clear guidelines and explicit expectations (Guilford 2001; Chuck and Young 2004; Lui, Lin and Yuan 2002). Feedback given to students can play a critical role in helping to clarify the expectations and standards (Taras 2002). In many instances, however, this feedback is given after the final report is submitted, as a summative feedback rather than formative. Use of peers (Wilmott, Clark and Harrison 2003) as a source of feedback allows a less threatening and more friendly and supportive means to provide initial feedback particularly if it is accompanied by a simple point by point checklist with all the specific criteria listed.

In an effort to identify and help correct the observed inadequacies in scientific report writing, we designed a procedure which we introduced as part of the required exercises early in the first year of the Genetics course. An assessment scheme was given to students in which one group received two consecutive cycles of feedback. They had to prepare a short scientific report based on a set of data collected for an experiment. The first draft of the scientific report was submitted to a laboratory partner for a round of peer review. This was returned to them for revision before submission to the laboratory demonstrator for a second round of feedback. Only after two rounds of review and revision were the reports finally submitted for assessment. This was carried out in parallel with two other groups of students who had either a self review using a checklist followed by the peer review or self review followed by the demonstrator's feedback.

Results from these three groups of students indicated the usefulness of the various cycles of feedback. Although we were unable to show any significance difference between the different treatments to the final grades of their reports, a number of key areas of need in the area of scientific report writing were identified. The exercise sets the stage for a longer term study and has provided a means to sort out those very weak ones who are in need of further attention at an early and critical stage of their university life.

## Methodology

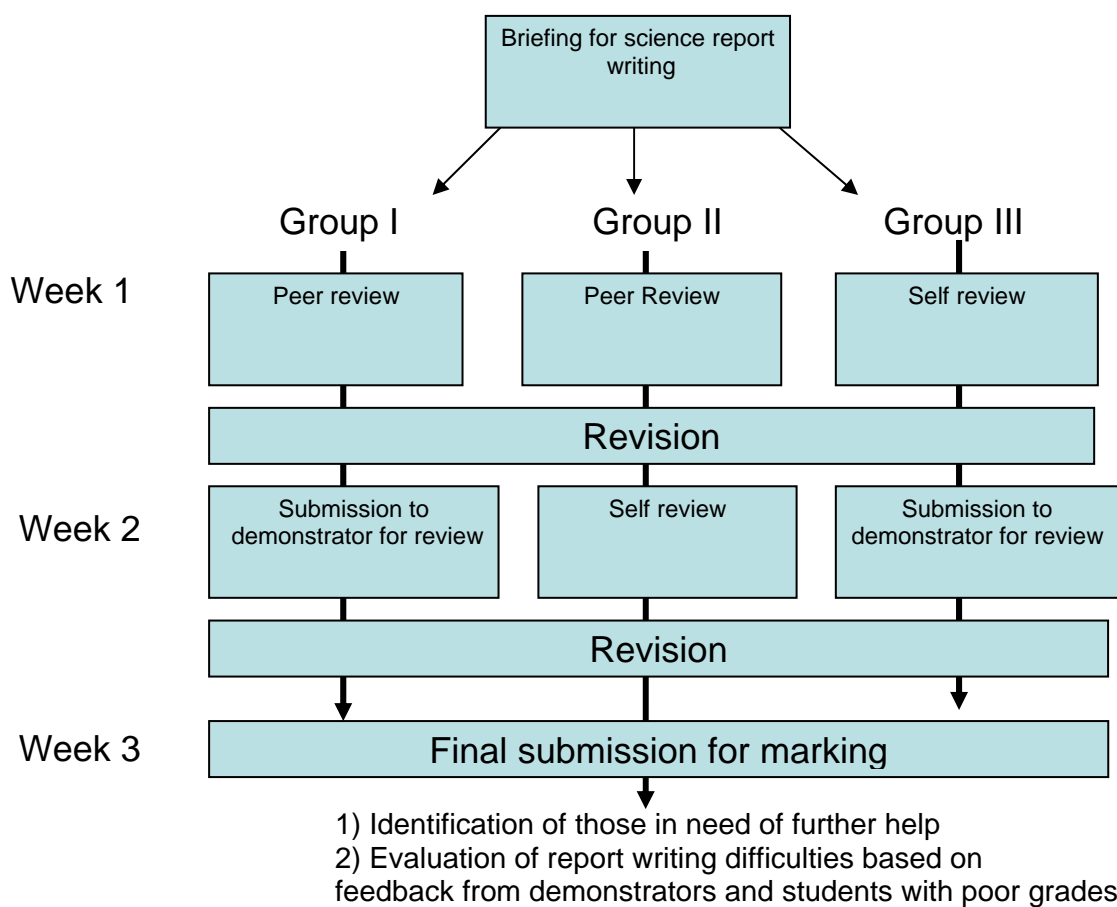
We have an annual intake of about 500 students in the first year Genetics unit BIO12GEN. For laboratory classes they are divided into three sessions. This allows us to have three different groups for the three different treatments. At the beginning, all the students were briefed on the correct aspects of writing the components of the scientific report. The important aspects of each of the components of the abstract, the introduction, methodology, results, discussion and references were



explained. A description of these expectations was available in a hard copy and distributed to all students. A handout describing a simple genetics experiment was given to them. It had a brief description of the experiment as well as the results of the outcome of the experiment. The students were requested to interpret the data, make their own conclusions based on the data and prepare their report. The following describes the different treatments given to the three groups.

**Table 1.** Table showing the different treatments of feedback for the three different groups in the study

Group	Self review	Peer Review	Demonstrator's review
Group I	-	X	X
Group II	X	X	-
Group III	X	-	X



**Figure 1.** Flow diagram showing the various time points and the process for the various feedback treatments for Groups I, II and III

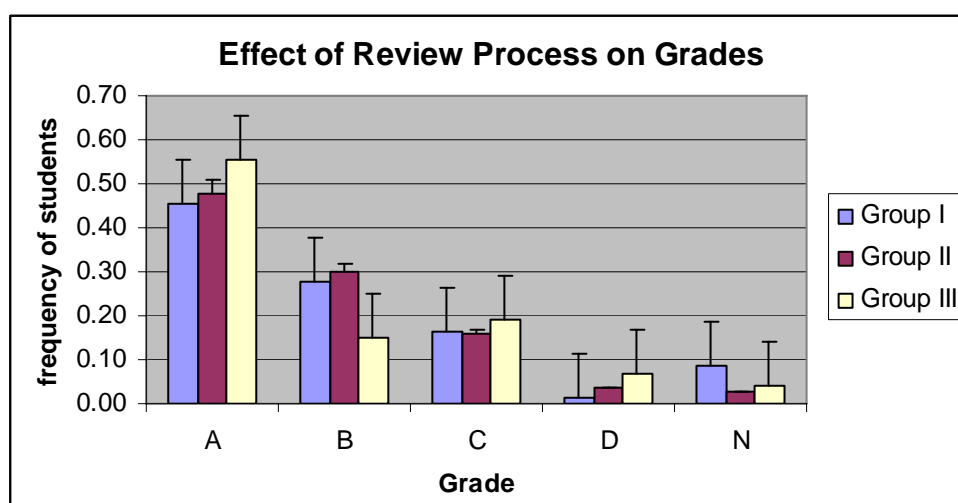
In Week 1, students worked on their report over the weekend and either submitted the report to their peers or demonstrator for review on the following Monday. The report was reviewed using a check-list which allowed the reviewer to insert a tick to indicate satisfaction or a cross to indicate inadequacies or the presence of errors. There was also space at the end of the check-list for the reviewer to add any comments if required. The reviewed manuscript was then returned to the student during their practical class (Thursday or Friday). The student had the opportunity to revise their report accordingly before submitting it for a second round of review. The final submission to the instructor was on the Monday of Week 3. Marks obtained from the scientific reports were collated and analysed.

## Results

The mean of the final marks for the scientific reports of each group was calculated (see Table 2) and a breakdown according to grades were also obtained to show the effects of the various treatments to their final grades (Figure 2). A chi square test of association was carried out for statistical analysis to determine the significance of the difference between treatments ( $p = 0.05$ ).

**Table 2.** Mean of the final marks for scientific report writing for the three different groups, expressed in percentage

	Group I	Group II	Group III
mean %	75	77	77
st dev	15.76	13.23	15.13
n	68	146	74



**Figure 2.** Graph showing the effect of the three different treatments on grades of final report submitted; expressed in terms of percentage of students within the group obtaining the grade. Group I, had a peer review followed by demonstrator’s review. Group II had a peer review followed by a self review and Group III had a self review followed by a demonstrator’s review.

The statistical analysis indicated that the mean of the grades in all three groups is not significantly different ( $p = 0.05$ ). The graph also reveals that the distribution of the results was skewed to the higher grades in all groups. Although we do not see a significant difference in the mean for Group III compared to the other groups, there appears to be a reduction in the number of students attaining a B grade, and an increase in the number achieving an A.

## Discussion

This is a preliminary study to determine if feedback in the form of a combination of peer review followed by a demonstrator’s review will make a difference in the grades of the final scientific report submitted by first year Genetics students. Results collected seem to indicate that there is no significant difference for the three different treatments. The mean obtained for the three different groups were  $75 \pm 15.75$  for Group I,  $77 \pm 13.32$  for Group II and  $77 \pm 15.13$  for Group III. Although the data obtained implied that the different treatments did not make any significant difference to the final mean results obtained, the final mean values for all three treatments were very high.

It would have been useful to compare the results of initial reports written by students before the review process was set in motion, this would enable us to determine the change in grades as results of



the various treatments. Subsequent studies will have to address this flaw in the design of the study. However, despite this drawback there are a number of useful findings that we can take advantage of. A collation of feedback from demonstrators indicated that those who obtained grades C and D were students who are having English as Second Language. This study has allowed us to identify, at a very early stage in their university career those students that are in need of attention and help to provide them with the appropriate intervention to enable them to cope with the demands of science report writing. They will be promptly referred to the University's Language and Academic Skills (LAS) unit and will be able to benefit from their assistance. Such problems in the past would have been picked up only when it surfaced much later at the end of the second year or even in their final year of university. In such cases, it would have been too late to provide the necessary assistance to make the difference that is badly needed.

It was also highlighted that the problems faced by students who did poorly fall into a number of difference categories. A number of them had difficulty with comprehension of the written instructions given to them in the handout. As a result they were unable to meet the standard and expectation required in the report. Others had problems with writing abilities, preparing a scientific report using a casual, conversational style of narrative rather than the concise and formal objective style that is preferred in scientific writing. Thirdly there are those who had difficulties in referencing and formatting as required in the bibliography. They seem to be negligent in following a particular consistent format expected in scientific report writing.

In conclusion, although we were unable to determine if a feedback assessment in the form of a peer and demonstrators review, had helped students in their scientific report writing, the study had been beneficial to allow us to identify at an early stage those student who require assistance. It also allowed us to identify specific weaknesses that can be addressed in order to help those weaker students. This study provides a platform for a more in-depth and longer term study to follow the progress of the students referred to LAS to determine if the assistance given had made the needed improvement in their scientific writing skills and their overall academic achievement.

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