Biology Liaison Report prepared by Bara Sarraj with Aigerim Bhizanova

Scientific writing in general microbiology courses

Introduction

Writing is an essential tool of communication in science in general and biology in particular. The format of scientific writing in biology follows the style known as IMRaD, short for Introduction, Materials & Methods, Results and Discussion. Using references was included as well. Specialized journals such as Science, Nature, Cell and Proceedings of the National Academy of Sciences publish biomedical findings following this style but with a variety of modifications. However, the undergraduate level of scientific writing is below average except for the top students. Because of this challenge, I created a brief template the students were asked to populate with their ideas regarding collected data of a specific lab. To strengthen the effect of the template, it was expanded with more detailed instructions as well as a rubric to guide students in their writing according to the aforementioned template.

Materials & Methods

The project was a part of the biology liaison of the assessment committee. The preliminary phase was to develop the rubric and enhance the template that students were supposed to use as a guide for their lab report writing. Two microbiology sections were enlisted for the preliminary phase of spring 2017. The final phase in fall 2017 enlisted two sections and biology courses other than microbiology. Because of the low number of students from other biology courses, three additional microbiology sections were enlisted in spring 2018. Students usually write four lab reports throughout a single semester. The third lab report was selected to analyze its writing efficiency as students proceed to a more advanced stage in the course. The fourth lab report was not selected for analysis because it adopts a different format. Submission of lab reports was via Turnitin Assignments online to exclude any plagiarism possibility. Lab reports were on the same subject and similar data of antibiotic resistance. The quality of work for each report part was estimated on a scale of 1-4 with 1 as mediocre, 2 as average, 3 as strong and 4 as excellent. 0 means the paper part was either not present or irrelevant to instructions. Total number of students for all microbiology course sections was 89 students.

Results

Table 1. The quality of work on a scale of 1-4.

	Number	Title	Introduction	Materials & Methods	Results	Discussion	References
EG17	18	2.06	2.89	2.56	1.83	1.83	1.67
SU17	22	2.27	3.27	3.41	2.32	2.91	3.00
EG18	21	2.05	3.05	3.05	2.71	2.76	2.57

KLQ18	12	2.42	3.25	3.25	2.50	2.67	3.00
SU18	16	2.50	3.69	3.25	3.13	2.75	2.94
Total	89	2.24	3.21	3.10	2.48	2.60	2.62

The quality of the paper components were shown in table 1. Only writing the Introduction and Materials & Methods was strong whereas the rest of the paper components were a little above average between 2 and 3 in our scale.

Discussion

Though the improvement in scientific writing was noticeable compared to previous semesters that lacked the template and rubric, but the progress of writing that took a year and a half was less than expected. Titles were more general than specific and some were scientifically inaccurate or faulty. The introductions witnessed failure to give the reader the scientific background of the cells, reagents, assay rationale and purpose. Materials & Methods were either inaccurate or too terse to allow the reader to repeat the assay if needed. Results showed student reluctance to explain data or pinpoint the most important finding to prepare for discussion. Discussions were mere repetition of the results section, stating known facts instead of analyzing data or contrasting with these known facts. The whole body of the report had seen failure to use external references, even if quoted, to elaborate or give further perspective on the subject. References were of low quality, very few or of the wrong APA format. Reports had shown Inconsistency in the effort spent and quality among the sections of the report. There were many strategies adopted over the semesters to improve scientific writing. One approach was to peer review online and in class. Samples of good and bad writing were analyzed and graded in class. Interestingly, students recognized well the bad elements of writing and utilized the provided rubric efficiently, but failed to avoid them in future lab reports. The template and rubric will be further refined and utilized, but more strategies in scientific writing improvement will be researched and adopted.