

Writing and reviewing an article for a science magazine — a peer-assessment exercise

Rob Reed and Melinda McHenry

Background and rationale

This exercise forms part of an introductory module in scientific communication, taught to classes of up to 100 science students in 'mixed mode' delivery (a combined cohort of on-campus and distance education students, collaborating through Moodle as their online learning management system). Specific focus is given to the concepts of primary scientific sources (original research) and secondary sources (review and discussion of research originally presented elsewhere), and to the role of peer review in the process of scholarly publication. Concurrently, the students are introduced to the notion of communication of science to a broader audience, and to the importance of conveying messages without bias, misrepresentation or exaggeration. Students are encouraged to participate in exercises and discussions relating to valid and effective communication, including the appraisal of selected examples of scientific journalism.

In the assessment task that follows the exercises and discussions, students are given a presentation on a current research topic by a research-active member of staff (distance education students access this online as a recorded videostream), in a session titled 'Science in Action'. This provides them with an introduction to the topic area that they will be working on, and to research material taken from primary scientific articles. The assignment requires students to apply the knowledge and understanding that they gain from the exercises, presentation and discussions to a two-part written exercise where students act as (i) author and then (ii) peer reviewer, to satisfy the following learning outcomes:

- Locate and interpret research information from the primary scientific literature, with appropriate citation of sources.
- Use appropriate forms of written scientific communication, in this module and in other modules within the programme.

How to do it

The following steps describe the principal stages:

- Having come to appreciate the difference between a primary source and a secondary source in the exercises, discussions and presentation, students are then instructed to carry out a literature search to find articles broadly related to the topic presented by the guest researcher. Students are provided with comprehensive resources and support to assist them in locating and selecting a single primary source from the recent literature to form the basis of their science magazine article.
- Students are also encouraged to consult other sources of information on the broad topic, in order to gain a better understanding of their primary source. As their final choice of a particular primary source should be of interest to a more general audience, students are also encouraged to locate an article that they find interesting. Typically, the students use online library databases (e.g. Science Direct and Scopus) to locate and select a suitable article.
- Students prepare a 1000–1200 word article based on their primary source, in the broad format and style of the 'This Week' section of the *New Scientist* magazine. Students are instructed to explain the main findings and broader implications of their chosen research paper to a general audience (*New Scientist* readers), while only citing the single primary source. Guidelines on the layout of the article are also provided (e.g. double-spaced, 12 point font, to include a word count and a full citation of the primary source).
- On submission of their report and details of the primary source, students swap their articles with a partner. Students then prepare a peer-review of their partner's article; the review (600–800 words) is a general commentary on the overall quality of their partner's article. Students

are again well-supported through this task, with guided tutorials on identifying ‘good communication’ and through concept-mapping the process of reviewing a manuscript.

- Students then consider the style and format of their partner’s article, the ease with which it can be read and how accurately and effectively it reflects the main aspects of the original primary source, without simply re-casting the text of the article’s abstract. The student reviewers are also asked to exercise their ‘new-found’ communication skills by suggesting improvements to their partner’s submission, if any are required.
- Students are assessed on their skills as (i) an author (including: ability to choose an appropriate and interesting primary source, the manner in which they communicate the research findings in a readable and accessible style, and their ability to identify and demonstrate proficiency in adhering to the assessment brief) and (ii) a peer reviewer (including: ability to identify the key aspects of the content of the primary source and their critique of the style of the author’s article in terms of the accuracy and validity of their review, and the clarity of their feedback).

Tips on using this approach

It is essential that students are given clear written instructions on the tasks involved, together with opportunities to discuss the assessment and ask questions, so that everything is clear from the outset.

In earlier versions of the exercise with on-campus students, self-selection of pairs was allowed. However, with on-campus and distance education students in the same module, students are now assigned to pairs by the tutor, based on the order of submission of the initial article. This is a little more work at the outset, but simplifies the overall process of record-keeping.

In previous years, a lecture dedicated specifically to identifying sources and understanding the requirements of a *New Scientist* article was given prior to submission of the first part of the assignment, while information relating to the review process was held over until just prior to the submission of the second part of the assignment. More recently, an integrated approach has been taken, where students have been encouraged to consider information sources

and critically appraise them simultaneously, prior to the submission of their original article. This approach appears to have resulted in an increased level of student engagement and enthusiasm for the task, and a corresponding rise in successful completion.

Troubleshooting

Apart from the occasional student who selects a secondary source rather than a primary scientific source as the basis of their magazine article, most of the issues relate to management of the pairing and peer-reviewing process:

- Sometimes it is necessary for students to work in threes rather than pairs — in such instances, each person reviews the work of a different person to their own reviewer. It works just as well this way and is an alternative approach, avoiding reciprocal peer-assessment.
- Occasionally, there are problems caused by one of the team members, e.g. where a student does not return their reviewed article by the specified date, or where someone is ill during the module — such cases have been dealt with by either (i) reassigning group members or (ii) asking one student to perform a second (unassessed) review, so that all elements of the process are covered for all students.
- It can be a little tricky marking the various aspects of different students’ work at different times — one approach is to mark the review (second student’s mark) at the same time as the original article (first student’s mark) to maintain continuity in reading the article, and to use a feedback ‘template’ sheet containing a number of general comments to provide overall feedback, as well as a mark for each aspect of the assessment. This structured approach works well with large cohorts of students.

Online submission of the original article through Turnitin enables similarity checking to be carried out on the text, to ensure that students are not tempted to base their article on any published magazine articles!

Does it work?

Feedback from the assignment has been positive, and comments from first-year students ranged from “valuable and interesting,” to “helped me to understand how to use critical thinking,” and “a realistic approach

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to science communication used outside university.”

Given the rather ‘dry’ nature of some of the material covered, such as referencing and professional communication, this is evidence that this approach provides effective engagement of students, since they see the broader significance of their learning and assessment activities.

Further developments

This exercise has run successfully in the UK and Australia for more than five years. To date, the peer/self-assessment component has been restricted to a broad overall evaluation of the other student’s article, based on written feedback, rather than having the reviewer provide a quantitative mark or grade. One aspect that would be easy to introduce would be for each student to be asked to provide a numerical mark for each aspect of the task, i.e. self-assessment of their original article and (ii) peer-assessment of their partner’s article, plus (iii) self-assessment of their role as a reviewer. Students would then be able to compare their own ‘marks’ against those of the lecturer, to see how effectively they were able to assess their own work and that of others, using the same assessment criteria as the teaching staff.