A method for teaching scientific report writing in English for nonnative speakers

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Jonathan Goodacre and Gerard B. Remijn

Summary

Most research and teaching material about scientific writing are aimed at native speakers in a particular subject area. Research and material concerning speakers of English as a second language seem to focus exclusively on grammatical structure and cognitive processes. It therefore appears that no material or instructional method combining scientific writing, as a skill in itself, together with requisite language knowledge are available. We reviewed the structure and phrasing of around 100 brief reports from the journals Science and Nature. This enabled us to compose a 5-stage model of a scientific report. Each stage has accompanying phrases and language points. Use of the model was taught to graduate students. The value of our approach together with possible limitations are discussed.

1. Introduction

Scientific communication is becoming increasingly standardized. Top journals not only demand high quality research but place restrictions on the format and language of submissions. These restrictions might be particularly problematic for non-native speakers of English who pursue an academic career. Speakers of English as a second language (L2) are often less likely to have read many research articles in English, let alone to study in an environment where English is used for scientific communication. Therefore, L2 speakers are bound to have less implicit knowledge of the requisite terminology and phrasing techniques. Most research and teaching material about scientific writing (such as published textbooks) are aimed at native speakers in a particular scientific area. The few teaching materials that appear to be available for L2 scientific writing normally only focus on detailed grammatical points. Research on L2 scientific writing, on the other hand, appears to analyze the cognitive processes involved in linguistic awareness (Hinkel, 1997; Paltridge, 1997; Lee, 1998) or text processing (Donin, 2004), rather than investigating or producing realistic instructional material. The points discussed above led us to believe that there was a need for a practical model of English scientific report writing. A "template" with associated language that can be used easily and enables L2 writers, regardless of individual scientific area, to produce scientific reports with the appropriate language and format.

2. Model for L2 scientific report writing and method of construction

To construct a model of a scientific report,

we chose to evaluate the format and language content of short articles in leading scientific journals (e.g. Nature, Science) which provide a highly respected and trustworthy international standard. We reviewed the structure and content of approximately 100 brief reports and rapid communications in these journals. From our analysis we constructed a model that can be used for L2 scientific writing, and gathered a large corpus of associated phrases (Figure 1). This model can also be used by less experienced native speakers of English. The model consists of five stages, labeled a to e. These stages are:

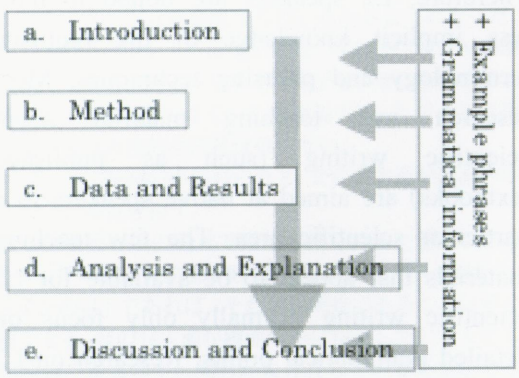

Figure 1. Model for L2 scientific report writing

a. Introduction

This stage consists of three sections that contain, respectively:

(i) general statements introducing the topic,
(ii) statements of the current knowledge about the topic (previous research),
(iii) a research question (hypothesis).

b. Method

This stage consists of two sections that describe:

(i) the research method and associated materials or apparatus used,
(ii) the participants/sample and instructions, if necessary, used in the research.

c. Data and Results

This stage consists of three sections about, respectively:

(i) classification and categorization of the data,
(ii) graphical and numerical description of the data,
(iii) statistical analyses of the data.

d. Analysis and Explanation

In this stage inferences and explanations regarding the research data are given, along with supporting argumentation.

e. Discussion and Conclusion

This final stage consists of three sections that typically contain, respectively:

(i) statements concerning the change in knowledge about the topic and the contribution of the paper/research to the scientific field (i.e. conclusion),
(ii) limitations of the current research and/or theoretical argumentation,
(iii) suggestions for further research.

For each stage of the model (a-e), we gathered a large number of corresponding phrases which the writer can use to perform the communicative tasks of the stage. The phrases came from the journals 'Nature' and 'Science' and can thus be considered as benchmark terminology in scientific report writing. For example, sentences associated with Stage a, section (ii) are: "Previous research has established that X"; "There is no evidence yet for a role of X in Y"; "While it is known that X, little consideration has been given to Y"; "An unanswered question in the field of X is Y", et cetera. Similarly, sentences associated with Stage e, section (i) are: " In this study, by doing X we were able to Y"; "Our results provide new information about X"; "Our

results support the view that" ; "Our results refute the view that" , et cetera. By correctly using these phrases the L2 writer can successfully both write the scientific report and in doing so gain more insight into the structure and terminology of a scientific report.

3. Classroom approach

The model was tested by the authors in a scientific writing class, taught over a period of three months to twenty masters students, doctoral students, and post-doctoral fellows of Kyushu University, Fukuoka, Japan. The students had volunteered to join the class, had intermediate (or higher) knowledge of English, and were studying in different scientific areas (ranging from psychology to architecture). In every class, a stage or section of the model was explained to the students and practice exercises and example phrases from the corpus were provided. The contents of the practice tasks varied greatly and covered popular scientific topics. The two authors supported the students and encouraged adherence to the model and associated terminology during individual writing exercises.

Although the main purpose of our method was teaching scientific writing and we therefore did not teach specific detailed points of grammar, students were provided with general grammatical information where necessary. For example, sections (i) and (ii) of Stage b, which covers 'Methods', employ the past tense (e.g., "We conducted an experiment on X") and often employ the passive voice (e.g., "Y was measured using X"). Furthermore, students were allowed to use a dictionary and grammar books. After fifteen hours of class, the students all completed a final examination in which they had to write a scientific report without guidance of the teachers or the teaching material. The final class gave feedback on performance and analysis of a model answer, thereby reinforcing the contents of the class.

4. Conclusions

After evaluating the exam performance of the students, and the students' evaluation of the class and the teaching material regarding the model, the main conclusions are:

1. Students were able to successfully complete exercises and reports, regardless of scientific content.
2. They became proficient at using the target scientific terminology.
3. The possession of the material (model and corpus of phrases) provides a valuable reference that saves time.
4. The model can be used to provide core knowledge to students with highly varying academic backgrounds who are studying different fields of science.

We should mention several points for further consideration. First, a caveat to the above positive points is that we do not know how successful some students would be in using the material outside of the classroom in a less supportive environment. Second, it remains an empirical question whether a more effective class could be devised. For example, one might start with more classes devoted entirely to writing exercises with more emphasis on grammatical constructions. We could have made a more detailed analysis of the language of scientific papers from a purely grammatical perspective and more explicitly taught the necessary points of grammar. An additional limitation is that our material may not be sufficient for some areas of science which require a highly abstract language of argumentation (e.g. theoretical

physics). Future work should address these points in order to strengthen the educational value of the model. However, the current teaching method and model have already proven to be a practical and beneficial way for teaching L2 scientific writing.

5. References

Hinkel, E. (1997). Indirectness in L1 and L2 academic writing. *Journal of Pragmatics*, 27, 361-386.

Paltridge, B. (1997). Thesis and dissertation writing: preparing ESL students for research. *English for Specific Purposes*, 16, 61-70.

Lee, I. (1998). Enhancing ESL students' awareness of coherence-creating mechanisms in writing. *TESL Canada Journal*, 15, 36-49.

Donin, J. (2004). Text processing within classroom contexts. In A. Peacock & A. Cleghorn (Eds.) *Missing the meaning: the development and use of print and non-print learning materials*. New York: Palgrave Macmillan.

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