Online Teaching of Creative Writing of Scientific Publications and Project Proposals Using Google Apps

Andreas Zitek[1], Alexandra-Strauss Sieberth[2], Dominik Ruffeis[3]

Abstract

Scientific writing is a core competence of academics, either to communicate their research in a structured way or to apply for project funding. It also supports the learning process itself. Efficient courses are offered rarely, taking an appropriate theoretical, motivational and interactive approach in guiding students through the process of writing which is considered the only way of effectively teaching this competence. Options to manage the distribution of teaching materials, to scaffold the writing process and to provide individualized feedback in time need to be established. To fulfil the above-mentioned requirements an interactive course for creative writing and teaching was developed within an Austrian Partnership Programme in Higher Education and Research for Development APPEAR project (SCARA-Strengthening Capacities for Agricultural Education, Research and Adoption in Kenya) for students at the Egerton University, Kenya. APPEAR is a programme of the Austrian Development Cooperation (ADC) with the aim to implement its strategy for support of higher education and research for development on an academic institutional level as a contribution to effective and sustainable reduction of poverty. To effectively distribute the content of the lectures and pre-structured template documents with clear guidance for writing, Google Drive together with Google Documents and Google Doctopus was chosen. This setup provided the option to track individual student progresses and allowed for individual feedback. To assess the perceived efficiency of the course, a student evaluation using Google forms was conducted at the end of the course. Out of 23 students 20 provided feedback. According to the feedback received, the course was able to engage students and to significantly enhance their competences in scientific writing of papers and proposals. The chosen approach based on Google Drive and Doctopus was rated as highly efficient in supporting the teaching and learning process. In conclusion Google Doctopus offers a very straightforward way of user/learner management, distribution of pre-structured templates, ways of tracking individual student progress and individualized feedback. This approach with the additional benefit of optional collaborative writing can therefore be recommended for online and classroom teaching of scientific writing, and is also applicable to other fields of science teaching and learning.

Keywords: *scientific writing, online tutoring, real-time feedback, google apps, doctopus;*

1. Introduction

Scientific writing is being considered as a key skill in academic studies and work. As a researcher writing publications and research proposals are key competences for career development.

However, it has been recognized, that scientific writing is a highly complex task [1] and still effective instruction with the adequate combination of instruction, scaffolding and individualized feedback is rare due to the complexity of scientific writing process itself, which includes to manage the domain and topic knowledge, handle metacognitive aspects with regard to the writing process and the intended text structure and to manage the executive control of the writing process [2]. Individualized feedback to the writing process is necessary, as problems during the writing process are usually highly individual. Pre-structured templates containing the main elements of a paper, including also the central argumentative elements of each section, can reduce the cognitive load and can significantly support the writing process of students [3, 4]. The idea behind advising novice graduate writers by providing pre-determined argumentative structures in text form has been named "argumentative zoning" [4, 5]. Furthermore explicit reading supports the metacognitive understanding of the required format of the text [2], and an introduction of the epistemological background of science enhances the understanding of the overall process of science [6]. Besides this, new technologies like Google Apps have been recognized to offer great options for online teaching and learning with the possibility to share customized writing templates with pre-structured templates [3] and of direct personal feedback and interaction in real-time during the writing process [7], which is very much needed to support writers at

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[1] University of Natural Resources and Life Sciences Vienna, Education Development Unit, Austria
[2] University of Natural Resources and Life Sciences Vienna, Education Development Unit, Austria
[3] University of Natural Resources and Life Sciences Vienna, IHLW, Austria

early stages. To simplify the distribution and support process for the teacher, Doctopus, a Google Addon, can be used. Doctopus 'gives teachers the ability to mass-copy (from a starter template), share, monitor student progress, and manage grading and feedback for student projects in Google Drive'. It has been recognized as powerful tool for writing practices, enabling real-time tracking of student progress, and abilities for direct real-time feedback and interaction [8, 9].

For an Austrian Partnership Programme in Higher Education and Research for Development (APPEAR) project - SCARA-Strengthening Capacities for Agricultural Education, Research and Adoption in Kenya, a very condensed approach for teaching creative scientific writing of publications and project proposals to students of the Egerton University, Kenya needed to be developed, as one main activity of the SCARA project is to engage young researchers in research work related to the main topics of SCARA project as part of capacity building in higher education. APPEAR is a programme of the Austrian Development Cooperation (ADC) with the aim to implement its strategy for support of higher education and research for development on an academic institutional level as a contribution to effective and sustainable reduction of poverty. A two-day training course based on Google Apps and Doctopus was set-up, run on 3.4.2017 and 4.4.2017, and finally evaluated by the participating students for its usefulness and impact.

2. Course design & evaluation methodology

2.1 Scientific papers
The course for scientific writing was developed based on own experiences as scientific writer, and enriched by existing literature [10, 11] as an interactive classroom based activity accompanied by Google Apps for the distribution and scaffolding the students during the writing process. The idea was, to write a 'mini-paper' using an 'as if' approach. The course duration was from 09:00 – 18:00 with breaks. The course design aimed at the incorporation of all necessary elements to convey the principles of scientific writing as easy and comprehensibly as possible. The overall structure of a paper was introduced using the 'hourglass model' [12], linked to the concept of the scientific method ((interest/idea, question, background research, research question/hypothesis, collect data, analyse data, publish) (according to the parallel 'hourglass' structure [13]). For the presentation of the course content, MS Power Point slides were created. As central element to support the writing process, Google Docs documents containing the pre-structured template of a scientific paper with argumentative zoning and example sentences was created. Tests were run with Doctopus and an example roster of email addresses and names to get familiar with the technology.

2.2 Project proposals
The course on proposal writing was mainly based on [14] enriched by own experiences and selected illustrations. It was also developed as classroom-based interactive activity using Google Apps for the distribution and scaffolding of the students. The course duration was from 09:00 – 18:00 with breaks.

2.3 Evaluation
At the end of the course (day two), feedback was collected from the students by a Google form, using the following questions:
- Gender
- To which faculty are you associated?
- What is the level of your studies?
- What was your level in SCIENTIFIC PAPER writing BEFORE the workshop? (5 levels)
- What is your perceived level in SCIENTIFIC PAPER writing AFTER the workshop? (5 levels)
- How many papers did you already write?
- What was your level in PROPOSAL WRITING BEFORE the workshop? (5 levels)
- What was your level in PROPOSAL WRITING AFTER the workshop? (5 levels)
- How many proposals did you already write?
- How would you rate the usefulness of the workshop for improving your scientific paper and proposal writing skills? (5 levels)
- What do you consider as the biggest barriers for your scientific work and writing?
- How do you rate Google Drive as tool for learning and sharing material? (5 levels)
- Any suggestion of how to improve the virtual communication/learning - also in future?
- What is your favorite reference management software tool (EndNote, Zotero, Mendeley...)?

- Which features are the most important for you when deciding for a reference management software like EndNote, Mendeley etc.
- What did you like most in the writing course?
- What could be improved in the future?
- Any general comment, you would like to give about the project, course etc.?

3. Course implementation

3.1 Scientific papers

The course on writing scientific papers started with an introduction to the nature of scientific communication, the necessity to write for academic success and by introducing the aim and targeted learning outcomes of the course. Then it was explained, what science basically is, and about its relevance for humans. This was followed by an epistemological introduction of the nature of human reasoning and its evolutionary development, based on relevant literature, e.g. the evolutionary epistemology of G. Vollmer and critical rationalism of K. Popper. As a basis for scientific working and writing, the scientific method and its steps was introduced and shown how scientific working and writing are intrinsically linked.

As a next step, the nature and importance of defining an adequate research question was introduced. This was followed by a creative writing session using the clustering method of G. Rico [15], a method highly recommended by many writers to produce a flow of thoughts. The result of the clustering should support the formulation of a research question according to own interests.

After the creative writing session, the structure of a scientific paper with its sections (Title, Abstract, Introduction, Methods & Materials, Results, Discussion, Acknowledgements, References) was introduced following the hourglass model.

This was followed by a reading session of a well-structured paper according to this writing model [16]. The reading exercise was used to sensitize the students for the structure of a paper ('which information goes where'). The instructions were, to first read the title and abstract, then to read the first 3-5 sentences of the introduction, next to read the end of the introduction for the research question, and then jump to the first 5 sentences of the discussion, and finally read the conclusion. Students were encouraged to mark unknown words, to cycle relevant aspects etc..

The reading session was followed by a short discussion of the content of the paper retrieved by the limited and focused reading. Next, the need and techniques for literature research, and appropriate citing was introduced. Hereby the essential citation types (paraphrase and excerpt) and citation styles (Chicago style, Harvard style as the author-date style of the Chicago style). Typical sources for searching literature were introduced, like SCOPUS or Google Scholar, however, unfortunately the access for most students to SCOPUS journals was not possible. As reference manager, EndNote, Zotero and Mendeley were introduced. For the course, a test version of EndNote was used. The session ended with searching for relevant literature references (n=3-5) for the chosen topic, importing them into EndNote, and testing the drag and drop possibility of references to Google Docs. References being imported like this into Google Docs from EndNote can be later translated into full references, when loading down the Google Docs document as MS Word document, and updating the bibliography. After this a short break was taken.

As a next step the working session started. First, all students that had arrived to the course where invited to fill their name and Email addresses into a prepared Google Table. Next, the pre-configured Google Doc documents for writing a paper were distributed using Doctopus. Students were asked to login to their Google Drive account and have a look on their new folders and distributed documents there. Besides the paper template, the presentation slides and selected literature were shared via Doctopus.

Then the working session started with defining the title and the structure of the introduction. Hereby the focus was on developing an appropriate title being very limited but specific and self-explanatory. In a next step the elements of an introduction were introduced. To keep the cognitive load for students as low as possible, the structure of the introduction was broken down into 2-3 generic sentences providing the frame for the study, followed by one sentence linking to the significance or need for the study followed by the research question/hypothesis at the end. Example sentences for each section were provided.

The meaning and structure of the method section was then introduced and explained using example method sections from the paper introduced during the reading session. The method should contain one sentence on how the study was performed (study setup), one sentence on how, when, where were samples gathered, one sentence about sample preparation, one or two sentences on what else

was used, one or two sentences on instrumentation, and one sentence related to statistical tests/analyses conducted.

The instructions for the results section were to write two sentences describing the main results ('anticipate the results'), build one table and one figure together with captions referring to them in text. Again, this was highlighted using example result sections from the paper used during the reading exercise. Also, the generic structure and elements of tables and figures including SI units used in scientific papers was introduced.

The discussion section was aiming at producing 5 sentences, starting with one sentence repeating and answering the research question, one sentences two sentences linking back to the objectives and questions raised in the introduction and linking to the results of other authors, one sentence about the restrictions of the study or methodological issues, one sentence describing the main conclusion, and one sentence suggesting future research directions.

Acknowledgements, issues about authorship, and the formatting of the reference section followed. Finally, the abstract was written also according to a pre-defined structure using 5-6 sentences: one sentence stating the specific question addressed, one sentence listing the main techniques or procedures, two to three sentences describing the results, one sentence describing the main conclusion. Again, example abstracts and potential beginnings of sentences were introduced.

Over the whole time of the course, between the instructions, the individual student progress was tracked using the word count function of the Roster of Doctopus, and individual feedback given, when needed/asked.

3.2 Proposal writing

As a starting point, the differences between a paper and a research proposal were highlighted. Two types of research proposals were introduced: basic research proposals and task or program-initiated proposals. Typical questions of reviewers and common mistakes when preparing proposals were shown. The main elements of a proposal were presented, and provided in pre-structured Google Docs templates with examples and instructions, following the same method as the paper writing course. Finally, templates for a time frame and for calculating the budget were introduced and distributed as Google Tables. Feedback and support was given during the whole writing process when needed.

4. Evaluation results

The course was participated by 23 students of which 20 (30 % female students and 70 % male students) provided feedback to the course. 17 were at the Master level and 3 were at PhD level. Six Master students had not written a scientific paper before, while the other Master students had written one or two papers before. The three PhD students had written two, six and seventeen papers before. Master students had written between one and three proposals before, PhD students had written between two and four proposals before. The perceived level of competence in paper writing before the workshop was bad in Master students (level 2) and medium in PhD students (level 3). After the workshop Master students rated their level of competence in paper writing as good (level 4) and PhD students as very good (level 5). The competences in writing research proposals before the course were rated as medium in Master students and as good in PhD students. After the course Master and PhD students rated their level of competence in writing a research proposal as very good (level 5). Google Drive was rated as a very good tool for collaborative learning and sharing material. Statements with regard to the improvement of virtual communication/learning in future were mainly dealing with requests for an improved strength of the internet and more time for individualized feedback, and for more interactive sessions after the workshop via the web and for mobile learning. Access to actual literature was named as significant barrier for scientific working and writing.

5. Discussion and outlook

The course, even within its challenging time frame of only two days for introducing the creative writing of scientific papers and research proposals, yielded very positive feedback and significantly increased the perceived competences of students. In general, the chosen approach based on Google Drive and Doctopus was rated as highly efficient for supporting the teaching and learning process, as also all students were having Google accounts and email addresses. After the course, still online communication, support and feedback went on for around two weeks, mainly related to feedback with regard to text produced during the course, and also scientific literature, to which the students did not have access. Based on the additional comments given by students, the course design for similar settings can be improved. In conclusion Google Doctopus offered a very straightforward way of user/learner management, distribution of pre-structured templates, ways of tracking individual student

progress and individualized feedback. This approach with the additional benefit of optional collaborative writing can therefore be recommended for online and classroom teaching of scientific writing and is also applicable to other fields of science teaching and learning. However, bad internet connection and the lack of access to actual literature might hamper scientific writing in such situations.

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