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## Faculty and students' perspectives and opinions regarding the use of case reports to develop scientific writing skills among undergraduate students

MA Gonzaga (BSc.) ; K Elsie (MBChB, M.Med, MHPE); B Francis (BSc.)

Radiology Department, School of Medicine, College of Health Sciences, Makerere University, Uganda

### Abstract

**Introduction** Teaching undergraduate students to write effectively has been a major concern in higher institutions of learning. Using written case reports is one way of teaching scientific writing skills to undergraduate students hence this teaching method was introduced for undergraduate radiography students at Makerere University.

**Objective** To determine opinions and perceptions of faculty and students about the use of case reports in developing undergraduate students' scientific writing skills.

**Methods** Interventional longitudinal study with a case control cross-over design was used. Data was collected in phases using questionnaires and focus group discussions. Thematic analysis was used for qualitative data; bivariate and logistic regression analyses were used for quantitative data.

**Results** All students and faculty members were positive about introducing scientific writing using case reports. Students who are exposed to writing case reports in a scientific way are more likely to develop writing skills compared to other students.

**Conclusion** The findings indicate that scientific writing skills can be taught to undergraduate students even in resource-constrained institutions.

### Keywords

assignments, problem-solving, workload

### Introduction

Generating and expanding the body of knowledge to meet or solve problems in society is a key function of universities<sup>[1,2]</sup>. Postgraduate research, however, requires effective scientific writing skills to report research findings<sup>[2]</sup>. Training of undergraduates in scientific writing has been increasingly emphasized in a variety of fields<sup>[3-5]</sup> but is often introduced towards the end of, for example, undergraduate medical curricula, if it is addressed at all<sup>[6]</sup>. There is growing awareness internationally of the need to teach writing skills, early in undergraduate training<sup>[7-9]</sup>.

Publishing of research usually is a tenure requirement thus acting as a strong motivator for academics<sup>[10]</sup>. Students, on the other hand, focus on passing examinations to meet university admission criteria which are linked to academic results<sup>[11-16]</sup>. Students learn what will be assessed which always drives learning<sup>[17,18]</sup>. Undergraduates should obtain skills to produce scientific works thus there is a need to incorporate scientific writing skills in every aspect of the education process and learning activities. Problem based learning (PBL) requires that learners need to be trained to identify and solve society's problems by means of research<sup>[19-21]</sup>. PBL involves three principles: learning is constructive, cognitive and contextual<sup>[22]</sup>. Learners

thus should be able to learn, understand and apply scientific writing skills. One method of achieving this is by including scientific writing assessment in students' assignments<sup>[18, 23]</sup>. To prevent learners from compartmentalising (and perhaps ignoring) scientific work they should be provided with basic scientific writing skills for implementation in assignments. If this is not done they are likely to ignore the vital lessons thus defeating the goal of creating a competent pool of individuals from whom the next generation of faculty will be drawn<sup>[24-29]</sup>. In scientific writing students start as novices who gradually learn how to think and eventually perform as experts<sup>[30,31]</sup>. An institution with an effective transfer of knowledge and vibrant faculty research activities should result in an equally vibrant student research community<sup>[22]</sup>. Short courses, projects and assignments have all successfully used to teach scientific writing which in turn motivated graduates to enroll for post graduate studies<sup>[32,33]</sup>. Students in the programs where research is emphasized have expressed a higher degree of satisfaction with the content of the programs in addition to developing critical scientific writing skills<sup>[34,35]</sup>.

A case study approach can also be used to implement scientific writing in undergraduate curricula. The benefits of using

case studies include: learners gain insight to explore the reported problems and its main points; learning strategy shifts the emphasis from teacher-centered to more student-centered activities; increased student motivation, interest in a subject and acquisition of basic scientific writing skills<sup>[36-38]</sup>. Given these benefits it was decided to introduce writing of case reports in the three year undergraduate radiography training program offered at Makerere University. The case report format was developed and aligned to the PBL model of learning. The students work in pairs and are required to identify and research a suitable topic relevant to each five-week course module. This requires self-directed learning (SDL); the students are provided with a research format to undertake research methodology: namely problem statement and objectives; literature review; presentation and discussion of the topic in a written case report for assessment purposes. By introducing case report writing for undergraduate radiography students, it was hoped that students would develop basic scientific writing skills that are needed not only for carrying out research, but also to prepare them for post graduate studies. In addition, these skills would probably help them to become thinkers and problem solvers in society. The purpose of this study therefore, was to find out determine the opinions and

perceptions of Makerere University College of Health Sciences' radiography students and faculty members in terms of the acquisition of scientific writing skills using a case report approach.

## Methods

Permission to carry out this study was granted by the Radiology Department Education and Research Committee. Participants provided written consent prior to completing the questionnaire and consent was obtained from participants before conducting the focus group discussions. All participants were assured of confidentiality and the focus groups consented to not taking their discussions outside the room.

Convenient sampling was used. Ten (n=10) faculty members developed the student case report templates and assessment guides and 25 (n=25) 2<sup>nd</sup> and 3<sup>rd</sup> year radiography students tested the research tools. First year radiography students were excluded as they are not well versed in the principles and implementation of PBL.

An interventional longitudinal study, that employed the case control cross-over design in which participants acted as self controls in both the intervention and follow-up parts of the study, was used. Data in this study were collected during the following four phases:

- A one day workshop was held for the 10 faculty members to design a case report template and assessment guide based on the objectives of the study. These participants were then handed a questionnaire to determine their opinions on: mentoring students in scientific writing; introducing scientific writing; the quality of students' writing abilities; and the effectiveness of the workshop. A five-point Likert scale was used for each question and statement: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree (Table 1). To ensure validity, the questionnaire was pre-tested and piloted on two independent faculty members who did not participate in this study.
- A questionnaire was handed to the participating students at the commencement of the study to determine their knowledge on scientific writing and perceptions of the introduction of case report writing in a scientific format. The five-point Likert scale above was used in questions and statements. The questionnaire was pre-tested and corrections were made to ensure validity.
- Following the completion of the questionnaire the 25 student participants were introduced, during a two-hour session, to the concept of writing case reports and the importance of writing case reports in a scientific way. The contents of Table 1 were discussed and queries addressed to ensure that the participants were fully informed that the case report assessment mark would contribute to their final overall mark of a particular course. It was agreed that writing case reports (based on Table 1) was to be implemented for five course modules offered over five weeks respectively. The participants agreed to two case reports for each module (n=10). At the end of each of the five courses the participants submitted their case reports for assessment and feedback was given to them.
- On successful completion and submission of the case reports at the end of the fifth course a second questionnaire was given to the participating students. This questionnaire contained the same items as the first questionnaire above

in order to compare their two sets of opinions, namely before and after the introduction of scientific writing and case reports.

Following the assessment of the case reports, focus group discussions were conducted with both groups of participants to determine opinions about the students' case reports and scientific writing skills, performance, challenges and ways of improvement. There were three focus groups: the faculty participants were in a group and the 25 students were in two groups. Opinions from all focus groups were recorded and transcribed. Participants were requested to validate the audio-taped discussions before leaving the focus group discussions.

### Data analysis

Quantitative and qualitative data were collected and presented in frequency tables and graphs. Bivariate analysis was used, where necessary, to compare two variables that related to the acquisition of writing skills. Statistical significance was assumed at 0.05. A thematic analysis of qualitative data was done for themes which were then grouped and classified. The three groups were requested to check the itemised thematic data for validity and accuracy purposes.

### Results

Thirty percent of the faculty participants (n=10) were female (n=3) and 70% were male (n=7). The students (n=25) comprised 10 female students (40%) and 15 males (60%). There were 11 and 14 2<sup>nd</sup> year and 3<sup>rd</sup> year students respectively. A survey was also done with the faculty participants immediately after the workshop. The faculty members all expressed a positive attitude on the use of case reports to teach scientific writing skills to undergraduate radiography students as they did not receive such mentoring themselves during their undergraduate training. The findings of a survey of the students' opinions during the recruitment phase revealed that most did not know about case reports and scientific writing. On the other hand there was lack of support of the proposed use of case studies to teach scientific writing skills but they were very positive after completing their case reports at the end of the fifth course. Comparison of pre and post exposure to case report writing showed that the exposure of students to writing case reports in a scientific way was about seven times more

Table 1: Case report template with the assessment criteria

NO.	ITEM	MAXIMUM MARK OUT OF 100
1	Case title	5
2	Abstract	15
3	Introduction	20
4	Case presentation	25
5	Discussion (includes referring to literature)	25
6	Conclusion	5
7	References	5
	<b>TOTAL MARK</b>	<b>100</b>

likely to teach them writing skills than not being exposed at all. All participants recommended progressive feedback as well as a summative mark attached to the case report. These two factors were significant bivariate analysis ( $p=0.002$  and  $0.004$ ) respectively. Four key themes emerged from the qualitative data, namely

- significance of teaching scientific writing
- use of case reports to teach scientific writing
- assessment of case reports
- challenges.

All participants were positive about the teaching of scientific writing skills and generally reported that these skills were significant for the undergraduate radiography students. Typical responses to this question read: excellent; research was valuable; the process was very exciting; and 'scientific writing should be maintained'. For example, a faculty member stated, "The introduction of scientific writing skills is welcome and it was long over due. This really makes our students be proud of calling themselves university students" and students reported, "We have been missing these very important skills. I can now competently consider myself knowledgeable in writing skills", and "With these skills, we can now be able to write for our medical journal. Indeed, the skills will also enable us to start our radiography newsletter".

Faculty participants reported satisfaction with the use of case reports to teach scientific writing skills. Reasons provided included: case reports give students an opportunity to choose a research topic and formulate research objectives, case reports are manageable, case reports are easier to assess, case reports make student understand a given topic deeper through

thorough literature search. For example: "Using case reports will make our students understand the subject matter more in a short time" and "Since time is limited, teaching writing skills using case reports is more feasible since case reports are shorter and will not strain the students". Similarly, students were positive since they indicated that case reports were shorter than other assignments and more interesting hence this had taught them writing skills in a scientific format. "With case reports, we not only learn how to write science, but also understand what we study more", one student reported, and another one stated "Case reports have really taught us how to write without encroaching on our time since they are short. They are better than having constant lectures on scientific writing since lectures are generally boring".

The assessment of case reports was a concern raised by all participants. Faculty participants reported that the only way to sustain case reports and scientific writing is by assessing the case reports and giving feedback to students. "Since assessment drives learning, students will only keep interested in writing their cases scientifically if the case marks will contribute to the overall mark", and "Assessment should be both formative and summative so that students are given feedback in order to improve, then a final mark in order to keep them motivated in writing scientifically". The student participants reported similar sentiments. "What percentage will the case report contribute to the final mark?", one student asked. "Since we have learnt writing case reports in a scientific way, these cases should always be assessed both during the process of making them and at the end as we spend a lot of time on them", another student said.

The faculty participants all reported some challenges in implementing scien-

tific writing using case reports. Common challenges were: additional workload due to scarce resources; limited time to give progressive feedback to students; continuous training of staff themselves in case report evaluation. However, they reported that with commitment and dedication this was a good venture. *"I think this is a noble cause and for the good of our students, we welcome it"*, one teacher concluded. Students cited additional work of case reports in addition to other learning activities as challenges. The students did not report any further obstacles of scientific writing and case reports.

### Discussion

Results showed that most of the teachers were willing to teach writing skills to undergraduate students as they (the teachers) recognised the significance of mentoring students in writing skills. At the time of recruitment, most students did not know about case reports and scientific writing as they had never been exposed to case reports or scientific writing. This may explain their indecisiveness about scientific writing. Many could also have decided to remain neutral for fear of exposing their ignorance about scientific writing and case reports. However, after the exposure to case report writing in a scientific format the majority agreed they had indeed acquired skills and that the experience of case reports and scientific writing allowed them to gain knowledge and a deeper understanding of the subject matter through documenting cases. Case reports, to teach writing skills, also fit in well with the PBL format used in many health training institutions as learning is contextual and student-driven. Thus the principles of PBL, such as formulating a topic, objectives and self-directed learning through literature search, are well supported by students when developing and preparing their case reports. Incorporating writing assignments within existing learning activities is more likely to keep students still interested in the exercise <sup>[5,11,13,14]</sup>. According to Dunphy and Williamson <sup>[30]</sup> it is from these students with skills in scientific writing that the next generation of faculty will be recruited.

All participants expressed concern about additional workloads. Teaching scientific writing skills as an independent course module would definitely require more human resources, more time within the curriculum as well as student and teacher commitment hence may be daunting challenges especially for resource-constrained institutions. However, this can be overcome by incorporating scientific writing assignments into existing courses <sup>[6]</sup> as students would view this as part of the course thereby reducing the demands on teaching staff. Encouraging students to work in pairs to develop single case reports would half the number of assessments done by teachers.

Assessing the case reports was a general concern. It is well known that assessment drives learning <sup>[34,35,38]</sup> hence emphasis needs to be placed on the issue of assessing students' written work. This should involve progressive feedback as students develop their case reports as well as summative assessments that contribute to the students' final mark. This will, in the long run, sustain the continuous process of developing students' writing skills.

This study has shown that students' assignments, such as case reports, can be used to teach scientific writing skills. Such skills could be taught in other types of assignments since, apart from learning how to write, students also acquire a deeper understanding of the case or subject they study. The small sample size was a major limitation of this study.

This study focused on opinions and perceptions thus it is recommended that further studies be conducted to objectively deter-

mine the acquisition of the writing skills by students.

### Conclusion

It is important to introduce scientific writing skills into undergraduate training and using short student assignments, such as case reports, within existing courses is one way of effectively implementing this. These assignments should always be assessed in order to keep students motivated in doing them.

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