THE TEACHING ADVANCEMENT at UNIVERSITY (TAU) FELLOWSHIPS PROGRAMME

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Title: Finding strategies to enhance scientific writing skills in postgraduate students.

by

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1. Problem Statement

Postgraduate students in the Department of Biological and Environmental Sciences at Walter Sisulu University have been observed to have poor writing proficiencies. As a result they tend to take long or not to complete their research papers or dissertations.

2. Aim

The purpose of this paper is to investigate challenges faced by postgraduate students with scientific writing skills and to find strategies or a model that can be used to address such challenges in institutions of higher learning.

Specific objectives

- To establish factors that affect the students' scientific writing skills, with particular reference to the BSc Honours students' experiences with writing research proposals and papers.
- To establish the supervisors' perceptions about the writing skills of their students.
- To develop appropriate intervention strategies that can be used to address the challenges identified (if any).

3. Methodology

The Design-Based Research (DBR) approach (Herrington *et al* 2007) was used to collect data from September to December 2018. The Test of Academic Literacy for Postgraduate Students (TALPS) model used by the University of the Free State (UFS) to address a similar challenge in 2010 was adopted and used for the 2018 cohort of Zoology postgraduate students. Twenty six (6 Honours, 8 Master's and 12 third year) students wrote the diagnostic Tier 1 version of the TALPS, which is usually backed up by a Tier 2 test which is more in-depth in addressing the issues identified. Although the test is ideally meant for postgraduate students, the third year Zoology students were also requested to write as they were likely to participate in the second iteration cycle of the project when they would be registered for the BSc Honours programme in 2019. The standard procedures, originally developed by van Dyk in 2006

(http://icelda.sun.ac.za) were followed to administer the test. The scripts were sent to UFS for analysis and interpretation. The marks obtained were ranked and coded according to the students' level of performance (Table 1).

The academic literacy tests are not psychometric in nature (du Plessis 2016) and therefore cannot be used in isolation. Questionnaires, normally used to collect non-factual data such as opinions and attitudes (Bethlehem 2009), were therefore administered to 14 MSc Zoology students to establish factors that affect their research and scientific writing skills. The questions entailed self-assessment of research skills with regard to writing research proposals and papers as well as assessment of the usefulness of the feedback given by the supervisors. The responses were gathered using the Liekert scale where average, satisfactory, good and excellent were allocated codes 1, 2, 3 and 4 respectively. The total score for each test item was calculated as the product of codes and counts multiplied by the number of test items divided by the sum of counts (Table 2). The perceptions given were used to validate the TALPS results.

The same set of questionnaires was administered to 10 Zoology postgraduate student supervisors to establish their perceptions about the research and writing skills of their students, whether or not they give feedback to the students, the kind of feedback given and whether or not they do manage to achieve the desired outcomes. The responses regarding the research skills were gathered using the Liekert scale where seldom, sometimes, often and always were allocated codes 1, 2, 3 and 4 respectively. The total score for each test item was calculated as the sum of products of codes and counts. For the supervisors' feedback, the responses were gathered using the Liekert scale where the categories <20%, 20-40%, 41-50%, 51-60%, >60% were allocated category scores of 10, 30, 45, 55 and 65 respectively. The total score for each test item was calculated as the sum of products of category scores and counts divided by the sum of counts (Table 3). The results were analysed using R, a statistical software often used for data classification or clustering (https://www.r-project.org).

4. Outcomes

4.1   TALPS Results

Table 1 presents the results of the TALPS Tier 1 test whereby students scoring 80% and above pose little or no apparent risk and therefore do not need to write further tests, students scoring between 75% and 80% pose minimal risk and can write the Tier 2 test only if it is necessary, students scoring between 55% and 74% pose less risk but should write the Tier 2 test, students scoring between 34% and 54% pose clear risk and must write the Tier 2 test and students scoring less than 33% pose a very high risk implying that academic support should be taken into consideration to enhance their success.

The results of the current study indicate that more than 50% of the participants showed poor academic literacy skills (scored less than 74%), indicating a need for further assessment. As one would expect, the majority of students in this category comprised third year students followed closely by Master's students and then Honours students. Interestingly, two students who scored the lowest marks (33% and below) were prospective MSc graduates whom one would expect to perform better than the other two categories since they are enrolled for the highest qualification in this group. This implies that if these students get enrolled for a higher qualification such as the PhD programme, the department would have to provide them with additional academic writing support as proposed by Samuels, Dean & Griffin (2012 in Lee & Murray 2015). The results also indicate that 50% of the students who scored good marks (75% and above) were third year students, followed closely by Master's students and then Honours students. The unpredictable nature of the student performance observed from the three student categories implies that undergraduate and postgraduate students are similarly challenged with writing skills as indicated by Lee & Murray (2015).

4.2 Perceptions on postgraduate student research and writing skills

4.2.1 Students' perceptions

At Walter Sisulu University, the minimum and average completion time for a BSc Honours programme is one year and the students normally submit an average of five drafts of manuscripts per year before their research papers can be accepted. The results of the present study indicate that the participants met this expectation.

When asked to self-assess, the students' scores ranged from 38 to 47. The three research skills in which students rated themselves highest were "Explain data collection procedures", "Find relevant literature" and "Determine research objectives" (Table 2). These skills are all concerned with issues that need to be addressed once a topic and field of research has been established and require minimal critical reading and writing skills as the students often work under the supervisors' guidance at this stage of the research process. The skills with the lowest scores were "Identify general research area", "Explain data analysis procedures", "Explain limitations of study" and "Formulate research topic". These skills are all concerned with establishing a field of research and finding a research topic, which requires a lot of independent and critical thinking, reading and writing. These results suggest that students need a lot of help and guidance at the onset of their research projects (James 2012).

The majority of the students found the supervisor's comments and suggestions useful, although understanding of the comments about the referencing style and grammatical errors from the supervisors was often lacking (Table 3). This is an indication of a scientific writing challenge revealed by the TALPS test earlier.

4.2.2 Postgraduate Student Supervisors' Perceptions

The majority of the supervisors indicated that most students take one year or less to complete their research projects and submit on average 3 to 6 drafts as indicated by the students. When supervisors were asked to assess the postgraduate student research skills, the results revealed that the supervisors' scores were generally higher than those of the students although there are instances where the supervisors seemed to have similar scores with the students (Tables 4 & 5). For example, the three skills

with the highest scores were "Use different sources of information", "Explain data collection" and "Describe research methods". The second of these skills is among those with the highest scores when rated by the students. The skills with the lowest scores were "Formulate problem statement", "Explain limitations of study" and "Read and summarize literature". The first two of these skills are also among those with the lowest scores when rated by the students. This implies that supervisors are equally aware of the research and writing challenges experienced by the postgraduate students.

4.2.3 Assessment of the feedback given by the postgraduate student supervisors to the students

The results (Table 6) indicate that the scores for this item range from 27.8 to 49. When asked to self-assess, supervisors indicated that the four feedback items with the highest scores are "Provides feedback", "Feedback provided helps students", "Students agree with comments" and "Students effect changes suggested". The three feedback items with lowest scores are "Students understand assessment criteria", "Students understand essay length" and "Referencing style comments". Students also had low scores for grammatical comments and the referencing style, an indication of a writing challenge (Table 8).

5. Conclusion

The inferences from the results of the TALPS and the survey data suggest that postgraduate students at various levels do experience scientific writing challenges. These students do not seem to understand some of the feedback comments provided by the supervisors and therefore fail to effect the changes suggested. At the same time, the supervisors seem to be equally aware of these challenges but because of the assumption that students at this level can write proficiently, they seem to be reluctant to address them. Unfortunately this assumption has been proved not to be true as the problem seems to stem from lack of feedback on academic writing assignments at the undergraduate level. It is recommended therefore that the postgraduate student supervisors should identify areas where students need guidance and distinguish them from those that require the students' independent critical reading

and writing and support them accordingly. Because some supervisors could be equally challenged with providing the appropriate feedback at the right time, co-operative teaching and learning in the form of communities of practise is recommended particularly in the context of large classes where provision of timeous and constructive feedback could be a major challenge. Research skills should also be introduced and re-inforced at the undergraduate level.

6. References

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