



HEARING IT FROM THE HORSE'S MOUTH: ENGINEERING STUDENTS' PERCEPTIONS ABOUT TECHNICAL WRITING AND ACADEMIC LITERACY SKILLS

Dr. Tsaona Seitsiwe Mokgwathi

Department of Technical Writing and Academic Literacy,
Botswana International University of Science and Technology, Palapye, Botswana

&

B. E. Otlhomile

Department of Technical Writing and Academic Literacy,
Botswana International University of Science and Technology, Palapye, Botswana

ABSTRACT

This paper discusses the undergraduate Engineering students' perceptions about the Technical Writing and Academic Literacy Course at a technical university. The study solicited the views of the students concerning the course to enable the researchers to better address students' needs. The study's theoretical framework was drawn from the co-constructivist approach (Klenowski, Askew and Carnell, 2006) [1] because of the interactive nature of the course. The co-constructivist approach emphasizes collaborative learning more than learning as an individual responsibility. The data were collected qualitatively through a questionnaire. A focus interview was also held with a select group of students. The results showed that the students had positive perceptions about the course and that it positively impacted on their studies at university and will also contribute to their success at the workplace. However, some students acknowledged that they still had weaknesses in technical writing and academic literacy skills.

Key words: Technical writing, Academic literacy, Success, Learning needs, Acquisition

1. Introduction

Communication Skills and Academic Literacy course continues to be taught in institutions of higher education despite the mixed reactions of the students to whom it is taught [2]. The course has been named in a variety of ways depending on what a given institution wants to emphasize. For instance, at Botswana International University of Science and Technology (BIUST), emphasis is on technical writing and imparting of academic literacy skills such as information search from various sources, proper citation of sources and referencing skills. Hence the course is known as Technical Writing and Academic Literacy (TWAL). In other institutions, for instance, at the previous institution where one of the researchers was working as a lecturer, the course is known as Communication and Study Skills. The course is so named since the communication aspect emphasizes the communication competency skills of speaking, listening, reading, and writing; while the study skills aspect deals with time management, note-making and note-taking skills and information search. However, emphasis has since shifted to information literacy skills to equip students with skills of information search and proper citation and referencing of sources.

Despite its multi-faceted labels, TWAL continues to be offered as a general education course that is mandatory for all students to study for at least one year. This is evidence that the course offers skills that students require in order to cope with the demands of learning at university and even beyond. In that regard, Agarwal and Yadav [3, p. 292] state that “with the information revolution and socio-economic changes in the new millennium, the importance of effective technical communication skills has increased.” They further assert that “as the professional world becomes more diverse, competitive and result-oriented, the importance of technical communication skills continues to increase [3, p. 292].

BIUST, like other institutions of higher education, also realized the importance of offering the Technical Writing and Academic Literacy course to its students. When the university had its first students’ intake in August 2012 in the two colleges – College of Sciences and College of Engineering and Technology, the course was not included in the curriculum. Within a year, the university realized that excluding this course was a serious omission; hence a decision was taken that the course should be taught during the first two years of students’ enrolment at BIUST. In January 2014, the university introduced TWAL to all undergraduate students of the university with the aim to help them develop writing and academic literacy skills within the context of the

specific needs of Science, Engineering and Technology, with emphasis on skills that are intended to enhance life-long learning. After one year of teaching the course to both first and second year engineering students, the researchers took a decision to evaluate the impact of the course by soliciting the views of the their students through a needs analysis study. This paper is a culmination of the said study.

2. Conceptual framework

The study's conceptual framework was influenced by the co-constructivist approach (Klenowski, Askew and Carnell, 2006) [1] because of the interactive nature of the course. The co-constructivist approach emphasizes collaborative learning more than learning as an individual responsibility. Learners are encouraged to identify issues in their organization that affect their learning and to strive to bring about change, hence the decision to solicit their views about the course. The feedback obtained from the learners was used to further improve the course and meet the learners' expectations.

3. Research problem

As mentioned earlier in this article, BIUST did not offer TWAL to its students until January 2014. This is paradoxical given the fact that in its entry requirements, BIUST states that a D grade or better in English Language at school leaving certificate (BGCSE or IGCSE) in addition to credits in Mathematics and Science subjects, is sufficient for the applicant to be admitted [4]. The implication is that many of its students may not be competent in writing in English. Therefore, there was need to enhance their communication in English as the Language of Learning (LOL) in Botswana, also the official language used in the secondary domain cluster functioning as the language of government administration, the judiciary, science and technology, trade and industry, and the media [5]. BIUST had also ignored the fact that these students come from General-English background at high school. Therefore, there was need to orientate them towards writing for Science, Engineering and Technology in addition to enhancing their communication skills to meet the expected standard at university. Further, the students are required to comply with academic writing conventions such as acknowledging and proper citing of sources, and using referencing techniques applicable in their disciplines. Furthermore, the attitude of engineering students towards a Communication in English course is generally known to be negative [2]. Hence the researchers undertook this study to establish the students'

perceptions about TWAL. To maintain the focus of the study, the following research questions were posited:

1. What are your perceptions about the Technical Writing and Academic Literacy course?
2. What impact has the course had on your studies?
3. What challenges did you encounter in learning academic literacy and writing skills?

4. Methodology

The study was conducted at Botswana International University of Science and Technology, a newly-established university of Science and Technology. The university is based in Palapye; a town situated in central Botswana, 270 km from Gaborone-the Capital. At the time of its inception, the university was mandated to be a leader in the diversification of Botswana's economy currently based on diamonds, beef and tourism, so that it also becomes a knowledge-based economy through Science, Engineering and Technology.

The study involved 30 third year undergraduate students (15 male and 15 female) from a total of about 150 students enrolled in the various engineering programmes; namely computer, energy, telecommunication, mining and geological engineering. The sample size comprised 20% of the total number of the third year students. The researchers considered this to be a sufficient sample since the selection of interview participants has little to do with numbers; the sampling is not done to get enough people to participate but to collect sufficient data [6]. All but one participant were holders of the Botswana General Certificate of Secondary Education (BGCSE), suggesting that almost all the students had gone through the public school system. Only one participant had International General Certificate of Secondary Education (IGCSE). However, there is no difference between the BGCSE and IGCSE as the two qualifications are deemed to be equivalent. All the participants were Batswana except two - one of Asian origin and the other of Zambian origin. The Batswana students stated Setswana as their first language except one who spoke Ikalanga as a first language. One of the two non-citizen students stated Malayalam as a first language and the other spoke Bemba as a first language. English was the main second language, suggesting that it is a language that many of them acquired at school. French was the other language that two of the respondents stated as an additional language they spoke. The age of the students ranged from 18-22 years. However, programme, gender, nationality, languages spoken, age as well as the nature of school certificate held were not important variables in this

study. The researchers were mainly interested in the views of the participants about the Technical Writing and Academic Literacy course.

The data were collected qualitatively through a questionnaire administered to the engineering students to solicit their views about the impact of TWAL on their education. The researchers focused their study on engineering students because it was the group to which they teach TWAL. The third year students were chosen for the study due to three reasons. First, they had started their studies at BIUST without the TWAL course since the course was introduced during their second year of study. Second, they were the most senior undergraduate students. Third, they would be able to assess the impact of the TWAL course on their studies by reflecting on the period before and after its introduction. Therefore, it was assumed that they would have an informed opinion about the course. In addition to the questionnaires, a focused in-depth interview was held with 10 students evenly drawn from the five engineering disciplines. Thus two students from each programme volunteered to participate in the focus interview. The focus interview was essential since it gave both the researchers and students further opportunity to bring to the fore any issues that may have been overlooked in the general questionnaire. Furthermore, the focus interview was meant to corroborate the data collected through the questionnaires.

5. Data analysis

The data were analysed qualitatively since the data obtained was characterised by the participants' own written words. The data was categorized and interpreted according to common themes in order to deal with the main theme of the study. Borgan and Taylor [7] define Qualitative design as "Research procedures that produce descriptive data; people's own written or spoken words and observations." The findings from the analysis assisted in answering the three main research questions as discussed in the next section.

6. Discussion of findings

The results from the questionnaire interview as well as from the focus interviews showed that the engineering students had positive perceptions about the TWAL course. Their views are discussed broadly under the three main research questions. The first research question was: What are your perceptions about the Technical Writing and Academic Literacy course? In response to this question, there was general consensus among the students that the course was very useful to

them. They indicated that it has enhanced their competency in the four language skills of writing, reading, speaking and listening. One student commented:

“It [Technical Writing course] is an interesting one, and a necessity for tertiary students.”

They further reported that the course has helped them to improve cohesion in writing; for instance, they can now link sentences correctly within paragraphs and also create a link between paragraphs. This results in a coherent piece of writing. When asked to rank the language skills according to their order of importance, the students ranked writing as the most important skill. This is not surprising given that several studies [8], [9], [10] suggests that engineers spend a significant part of their working time producing written documents of different kinds. The next important language skill, according to the students, was speaking. In particular, they expressed that enhancement of their speaking skill enabled them to make effective oral presentations. Schulz [11] classifies presentation skill as one of the soft skills that fulfil an important role in shaping an individual’s personality and that “It is of high importance for every student to acquire skills beyond academic or technical knowledge (P: 146).” Engineers need to persuade others of the utility of their designs, products, and services. This could either be during an oral presentation session or through writing [12]. The students’ responses from the focus interviews also reiterated their positive perceptions about oral presentations. They stated that the course gave them a broader understanding of how important oral presentations are. The oral presentation sessions they had built their confidence.

Reading was rated as the third most important language skill. The researchers found the students’ rating of reading as the third most important language skill to master quite interesting given the importance of reading at university. The implication here seems to be that students do not make an immediate link between reading and writing. Research suggests that avid readers tend to have a good command of the language in which they read, including writing. For instance, Ferris and Hedgcock [13] state that extensive reading ... may dramatically enhance ... skills ... related to comprehending and producing written texts. It seems students define literacy in reading as being able to read what is written only. However, at university, reading is more than that; it amounts to reading with a purpose. Hence it is termed academic reading. Therefore, an academic reader should be a strategic and selective reader. He should be mindful that success at university is

often about meeting competing demands and deadlines. Therefore he needs to get the most out of the reading in the limited time available.

The language skill of listening seemed to be the least important to the students as it was rated the fourth most important. However, in the views of the researchers, listening is a natural partner to speaking. Furthermore, since information is imparted mainly in the lecture rooms through lectures delivered by a lecturer or through a video, a student needs to be an active listener. Being an active listener enables the learner to follow the pattern of the lesson and to capture important points in the form of notes. Notwithstanding that, a few students from the focus interviews specifically stated that the course improved their listening skills. One student commented:

“The course helped me to be attentive in class.”

Concerning the Academic Literacy module, the students had positive perceptions about it, and regarded it as the next most important skill after the language skill of writing. This module specifically deals with information literacy skill in the form of searching for information in the library or on the internet, correctly citing sources (verbatim or paraphrased) as well as acknowledgement of references used. The students stated that the course has improved their information search, especially from electronic sources. It has also coached them on how to cite sources correctly and exposed them to different referencing styles. Some of the students articulated the benefits they derived from the Academic literacy module as follows:

“I learned how to use different styles of referencing”

“I was able to improve how I conducted my research and how I referenced sources according to the different formats.”

“The module helped me to know the different styles of referencing, especially referencing of journals.”

“To some extent, it has improved my referencing skills and information search.”

“It [Information literacy skill] is not yet perfect but it is slowly improving.”

“I am able to consult different references and explore information search engines better.”

The students’ positive perceptions expressed above confirm that students enter university with little or no knowledge about Information Literacy skill. This is not surprising given that at secondary school level, students are not required to acknowledge sources or to produce a reference list as evidence of research carried out. However, at university, mastering of

Information Literacy skills is an integral part of academic literacy. One cannot say he or she is academically literate if he / she cannot efficiently utilize the different search engines to retrieve required information within a short time. In addition, academic literacy requires the student to be able to use the various sources consulted in an efficient and legal manner. This may involve citing the sources used within the text produced and then preparing a list of all references at the end of the text. In that regard, Masic [14, p. 148] talks of two formats of citation as "... in-text citations where sources of information are briefly identified in the text" and "... the reference list at the end of the publication ... that provides full bibliographic information for each source." Whether a source has been used verbatim in the form of a quotation or paraphrased, the bottom line is that "the references must be accurate, complete and should be accurately applied [14, p. 148]."

Although the students generally had positive views about the course, there were a few (5/30 or 16.6 %) who were of the view that the course was not beneficial to them. Three of them did not state their reasons for their negative perceptions. The two who gave reasons stated respectively that the course was not challenging enough and that since they had already done the course in the previous year, they did not find it necessary to do it again. However, what these students did not appreciate was that in the previous year, they were given a general appreciation of the different modules of the course. In the subsequent year, the course specifically focussed on the application of the skills learnt to specific situations of research, report-writing and oral presentations.

The second research question was: What impact has the course had on your studies? Through this question, the researchers sought the respondents' views on whether the skills they learnt in the course enhanced their learning and if they found them applicable in the other courses. The data revealed that the TWAL course positively impacted on the students' writing. The students indicated that the course sharpened their report-writing skills, notably laboratory reports. Other skills enhanced were note-making skills, portfolio creation, in-text citation and referencing skills. At university, students are expected to be less reliant on their lecturers. Lecturers are mere facilitators of learning whilst students are autonomous learners and need to discover information on their own. Hence it is vital to master the skill of note-making – be it during a lesson or research. Portfolio-creation is also important to know since through a portfolio, students can provide explicit examples to prospective employers when seeking employment about what they know and what they are able to do. This type of portfolio is referred to as showcase portfolio [15]. In-text citation and referencing skills are necessary for students to master so that they

summarize and paraphrase ideas of other authors correctly and acknowledge the sources they have used, lest they are accused of plagiarism. Pecorari and Petriç [16] define plagiarism as “literary theft, stealing (by copying) the words or ideas of someone else and passing them off as one’s own without crediting the source”. Over and above, the students stated that the course promoted team work as most of the work given required them to work in groups.

The students further indicated that what they learnt from the course was applicable in a number of courses. Some of the courses mentioned were Material Science, Earth Science, Introduction to Engineering, Analogue Electronics and all other courses that require report-writing such as laboratory experiments in Physics. One student from the Energy Engineering programme specifically stated:

“Technical writing assisted me a lot in my discipline energy. In energy, we always compile reports. Therefore the knowledge from this course [Technical Writing] made the work very easy for me.”

Another student from the Mining Engineering programme wrote:

“In Mining Engineering, there is so much reports to be prepared; and it [Technical Writing course] helped me to prepare such [reports].”

The students’ views were confirmed later when students arranged with the researchers outside class to further enhance their report-writing skills. Engineering students are required to produce a detailed technical report based on the task they are given [17]. Notwithstanding the above positive views, there were a few students (4/30) who felt the course did not impact their studies in any way, regrettably; they did not advance any reasons. However, the very small number involved was too insignificant. Ironically, when the students were further asked if they would recommend the course to new students, all of them answered in the affirmative. This response nullified the negative perception expressed above. The TWAL course had generally met the students’ expectations.

The last research was: What challenges did you encounter in learning Technical Writing and Academic Literacy course? This question solicited the students’ views on any learning difficulties they may have encountered in the course (course content and how it was delivered). All the students except one said they did not encounter any challenges in the content. The student who encountered some learning challenges stated that the major problem was vocabulary usage

and interpretation. The underlying problem for this student may be low vocabulary which could be due to poor reading skill. Research has shown that reading improves and reinforces vocabulary development [18]. Therefore students with higher level of vocabulary are likely to excel in their studies as reading has a reciprocal relationship with writing.

Despite their positive comments about the course content, the students commented on the course delivery. They felt that the course should be more interactive, that they should be given more take home assignments and that they should be provided with notes after every lecture. It is worth noting that tasks for tutorial sessions were deliberately designed to facilitate student-student interaction and student-facilitator interaction. The lecture hour was strictly for the introduction of the topic to give students its key points. While the researchers concur that there were fewer take home assignments, this was deliberate as the amount of work that students did during the tutorial sessions was sufficient taking into account the number of credits each student had to fulfil per semester.

On what else they would like to learn in the course, the students indicated that they required more practice in oral presentation skills and that they should be trained on how to write journal articles. The researchers took note of the first recommendation, but concerning the latter, they found it to be beyond their mandate. Training engineers on how to write scientific journal articles is the sole responsibility of the lecturers of engineering. Leki [19, p. 10] shares the same notion that “biology professors learn to write articles the way biology professors do by reading articles that biology professors have written”. The lecturers of TWAL can only assist on the language aspect and document formatting. The students’ recommendations confirm that for the students of engineering at BIUST to excel, there should be collaboration between the lecturers of content subjects and TWAL lecturers.

7. Limitations

The main limitation of this study is that only 20% of the third year students was involved. Therefore, the views expressed and the interpretation of the data is only applicable to the participants in the study. Hence the results cannot be generalized to the entire third year engineering group. A quantitative study involving all the 150 third year students would give a true picture of how this group of students perceive the TWAL course. BIUST has three colleges, namely; Engineering and Technology, Sciences and Information Communication Technology. The results of the present study cannot be reflective of the views of students from the other two

colleges. A similar study involving students from the colleges of Sciences and Information Communication Technology would need to be undertaken to solicit their perceptions about the TWAL course.

8. Implications

Despite the study's limitations articulated above, there are a number of implications that emerged from the study. First, the TWAL course fills a knowledge gap that exists among students entering university. Students come with general English background, are more reliant on their teachers and have little or no knowledge about how to avoid plagiarism and the consequences of not citing sources correctly or not even citing sources altogether. The course trains the students on how to write specifically in their disciplines, equips them with skills that assist them to become autonomous learners, to engage in knowledge discovery, how to write texts that are academically fluent and how to use the ideas from various sources without plagiarising. Second, the course is an integral part of training an engineer. The skills taught in the course such as oral presentations, research and report-writing are inherent in the working life of an engineer. Research has shown that engineers with good communication skills are likely to move faster on the professional ladder than those with poor communication skills [20], [21], [22].

9. Conclusion

From the findings of the study, the researchers can confidently say the Technical Writing and Academic Literacy course is beneficial to the engineering students. The students' own positive perceptions are a testimony to Kerley & Nettles [23, p. 2] who argues that "when students engage in learning through acquisition of Critical Academic Literacy skills, they succeed and they persist in education and continue in meaningful relation with all of life." The students have realized that the course is crucial for them to succeed in their discipline-specific courses and eventually in their programmes. The skills acquired from the course will also become useful to them once they join the world of work as practicing engineers. The students' views have also endorsed one of the objectives of the course: To equip students with key competencies for academic and life-long learning [24].

In conclusion, the researchers recommend that there should be collaboration between lecturers of TWAL and lecturers of discipline specific courses that students have cited as courses in which

they apply the skills they learn from the TWAL course. Collaboration could be in the form of material sharing. TWAL lecturers could use material from these courses when teaching the said skills at the same time that the same content is being handled in the discipline-specific courses. That way students would immediately apply the skills learnt and will also see direct relevance of the TWAL course to their learning.

References

- [1] Klenowski, V., S. Askew & E. Carnell, 2006. Portfolio for learning, assessment and professional development in higher education. *Assessment & Evaluation in Higher Education*. Vol. 31(3):267-286. June.
- [2] Beer, D. F. Reflections on Why Engineering Students Don't Like to Write – and What We Can Do About It. *Reflections on Communication*, 2002.
- [3] S. Agarwal and G. Yadav, “Technical Communication for future Engineers”, National Conference on Synergetic Trends in engineering and Technology (STET-2014) *International Journal of Engineering and Technical Research* ISSN: 2321-0869, Special Issue, pp. 292-293, 2014.
- [4] Botswana International University of Science and Technology. Undergraduate Prospectus for 2015/16.
- [5] T. S. Mokgwathi, “Role of code-switching in teaching and learning in selected senior secondary schools in Botswana”, PhD thesis, University of Pretoria, Pretoria, 2011.
- [6] Magogwe, J. M. S. *Language learning strategies of Botswana students: An exploratory study*. DPhil thesis. Edith Cowan University, Perth, 2005.
- [7] Guy, R. F., Edgley, C. E., Arafat, I. & Allen, D. E. *Social research methods: Puzzles and solutions*. Boston: Allyn and Bacon, 1987.
- [8] M. L. Kreth, “A survey of the co-op writing experiences of recent engineering graduates”, *IEEE Transactions of Professional Communication*, vol. 43, no. 2, pp. 137-152, June, 2000.
- [9] J. A. Leydens, “Novice and Insider Perspectives on Academic and Workplace Writing: Toward a Continuum of Rhetorical Awareness”, *IEEE Transactions on Professional Communication*, vol. 51. no. 3. pp 242-249. September 2008.
- [10] H. Silyn-Roberts, “Using engineers’ characteristics to improve report writing instruction”, *J, Prof, Issues Engineering Education Practice*, vol. 124, no. 1, pp. 12-16, 1998.
- [11] B. Schulz. The Importance of Soft Skills: Education beyond academic knowledge. In *NAWA Journal of Language and Communication*. pp146-155, June, 2008.
- [12] D. A. Winsor, “Writing Like an Engineer: A Rhetorical Education”, Mahwah, NJ: Lawrence Erlbaum Asso, 1996.

- [13] D. Ferris & J. Hedgecock. Teaching ESL composition: purpose, process and practice. Lawrence Erlbaum Associates, 1998.
- [14] I. Masic. The Importance of proper Citation of References in Biomedical Articles. In ACTA Inform Med, 21 (3): 148-155, September, 2013.
- [15] C. Danielson & L. Abrutyn. An Introduction to using portfolios in the Classroom. Alexandria: Association for Supervision and Curriculum Development, 1997.
- [16] D. Pecorari and B. Petric, "Plagiarism in second-language writing", *Language Teaching*, vol. 47, pp. 269-302, June, 2014. <http://journals.cambridge.org/LTA> Accessed: 25 August 2015.
- [17] F. J. Lino and T. P. Duarte, "Research Skills Enhancement in Future Mechanical Engineers", *iJEP*, vol. 1, issue 1, pp. 20-26, April, 2011.
- [18] <http://www.cuhk.edu.hk/wac/newsletters/N4a.pdf> Writing Tips. Accessed 27th August 2015.
- [20] A. L. Darling & D. P. Dannels. Practicing Engineers Talk about the Importance of Talk: A Report on the Role of Oral Communication in the Work place. Communication Education, Vol. 52, no. 1, pp. 1-16, January, 2003.
- [21] M. J. Riemer . English and Communication Skills for the Global Engineer. Global J. Engng. Educ., vol. 6. no. 1. UNESCO International Centre for engineering Education (UICEE). Melbourne, 2002.
- [22] S. Seetha . Communication Skills for Engineers in Global Arena. International Journal on Arts, Management and Humanities 1 (1): pp1-6, 2012.
- [23] Botswana International University of Science and Technology. Technical Writing and Academic Literacy Course Guide; 2015.
- [24] J. Kerley & S. Nettles. Improving Students' Critical Academic Literacy through Enhancements in Classroom Pedagogy. Gulf Coast Community College, 2010. Accessed 24th August 2015.