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USING PORTFOLIOS AS TEACHING AND ASSESSMENT TOOLS IN A TECHNICAL
WRITING COURSE: A CASE STUDY

Dr. T.S. MOKGWATHI

Lecturer in Technical Writing and Academic Literacy
Botswana International University of Science and Technology
P/Bag 0016; Palapye' Botswana



Dr T.S. MOKGWATHI

ABSTRACT

This paper describes how an academic portfolio was used to teach and assess the Technical Writing course offered to engineering students at a technical university in Botswana. For a long time, a misconception was abound that portfolio creation is only relevant to practical courses, and cannot be used in the teaching, learning and assessment of a non-practical course such as Technical Writing. However, lecturers of this skill-based course at the said university have embraced portfolio creation to coach and assess the writing skills of engineering students because through it, students demonstrate their writing capabilities through various writing tasks they undertake in class, during tutorials and outside the classroom. The conceptual framework of this study was derived from the co-constructivist approach by Klenowski, Askew and Carnell (2006). This qualitative study involved 118 second year students enrolled for various engineering programmes. The students worked in small groups consisting of six students per group; and 19 portfolios in total were produced. The contents of the portfolios were analyzed qualitatively. The results showed that portfolio creation gave students an opportunity to showcase what they have learnt in the course, and that it was also an appropriate assessment tool of their writing. It is therefore, recommended that portfolio creation should not only be an integral part of assessing students' performance in Technical Writing, but should also be extended to other courses and programmes in the university.

Key words: Portfolio, Teaching tool, Assessment tool, Technical Writing, Showcase

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1. INTRODUCTION

For a long time, portfolio creation was used to stimulate the professional growth of students in practical courses such as medicine and related fields (Prop, Shacklady, Dornan & Driessen, 2007). However, portfolios are now increasingly being used as teaching, learning and assessment tools of non-practical courses. For instance at the Botswana International University of Science and Technology (BIUST), lecturers of the Technical Writing(TW) course, a skills-based course, have embraced portfolio creation to coach and assess the

writing skills of their students. The decision to adopt portfolio use was a result of realization that it will enable the students to demonstrate their writing capabilities by showcasing all the work they have done during the duration of the course. Furthermore, portfolio creation was intended to address a number of issues. Firstly, it was meant to motivate the students to give the course the attention it deserves. Literature has shown that the attitude of many engineering students towards a course of this nature is not good. "Many engineering students approach a technical communication course with reluctance" because for many of them "their memories of high school and college ... English classes are not pleasant (Beer, 2002: 364). Secondly, to ensure that students are committed to their work knowing it builds towards the final document they shall produce at the end of the course, and on which they shall be assessed. In that regard, Brown (2003: 7) talks of "a range of small tasks throughout the learning programme to ensure that participants are actively engaged in learning activities that can culminate in the final assessment." Thirdly, to ensure students have a tangible showpiece as evidence of what they have learnt in the course or what Danielson and Abrutyn (1997) refer to as showcase portfolio. Next, to equip students with a skill that may be applicable to other courses or in the respective programmes for which they are enrolled at the university. Portfolio creation is also meant to coach students on self-organization skills. For instance, at Mohawk College, students are taught to create portfolios which they could use to demonstrate professionalism, ability to plan and to master self-organizational skills. Therefore students were taught to produce portfolios that could serve as learning tools as well as tools that lecturers can use to assess the students' performance.

An educational portfolio is a fairly new concept in the education system in Botswana in general and in TW in particular, except for a few practical subjects such as design and technology, Art, and Fashion Design. This was evident when an educational portfolio was introduced; many students had no idea of what it entailed and what its purpose was. However, in other countries, an educational portfolio has been in use for a long time such as in Spain, Finland, Australia, the United States of America and South Africa [which is nearby] (Kakkar et.al, 2001). The Technical Writing Centre decided to embrace the use of an educational portfolio because it is believed that a well-designed portfolio system can accomplish the following: It can motivate students in their learning since it requires application of skills learnt; it can provide explicit examples to an assessor (lecturer or examiner) and prospective employers about what students know and are able to do; and it can allow students to reflect on the road-map they have followed which mirrors their growth over time, reflect on it and assess their own progress (Ferguson, 1992). Frazier and Paulson (1992: 64) rightly summarize the purpose of portfolio creation that it "offers students a way to take charge of their learning. It also encourages ownership, pride and high self-esteem."

2.0 Conceptual definition of a portfolio

Various authors have defined a portfolio in various ways. In the context of this paper, a portfolio is defined as a purposeful collection of a student's work that tells the story of a student's efforts, progress, or achievement in a given area over a period of time (Barrett, 2002; Fogerty and Pete, 2005; Frederick and Shaw, 1996). Danielson and Abrutyn (1997) refer to this type of portfolio as an assessment portfolio. Portfolios have been in use in many professions such as in the arts and finance. According to Barrett (2003), in the arts, artists use portfolios as collections of their best works which they use to market themselves when seeking work assignments, while in finance a portfolio gives a comprehensive record of fiscal transactions and investment holdings that represent a person's monetary worth. Upon adoption of portfolio use in education, students were required to select and collect work that shows their knowledge growth over time in a given course or programme.

In the Technical Writing Centre, while portfolio use was adopted to allow students to put together work they have done that shows knowledge acquired in the course, the students are not allowed to select only the best 'artifacts'. They are expected to include everything covered because a portfolio should be a reflection of what the course entails. The rationale is that a portfolio should be an informative academic document to its readers – both lecturer and student. It should inform the lecturer about a student's capability, and where remedial teaching is necessary, it can be arranged. It should also inform the student about his or her own strengths and weaknesses in the course so that he or she can reflect on how to address the weaknesses.

Because a portfolio is to serve an academic purpose, being a learning and assessment tool, students should not only learn from their 'good' work, but they should also have time to reflect on their mistakes. In addition, the lecturer should go through the portfolio and assess its contents and award befitting marks. A portfolio that gives overall picture of what the students did is, in the view of the researcher, a genuine portfolio that tells a true story about the student's ability to himself/herself and to other potential stakeholders. Therefore, the definition of a portfolio by Frederick and Shaw (1996);Barrett (2002); and Fogerty and Pete, (2005) best suits the portfolio that students produce for the TW course.

Furthermore, Mayo & Thompson (1995) and West (1992) state that portfolios in education have been used to address adult students' academic needs. For instance, a portfolio may be informative to a new institution that a student may be transferring to. It can be used to adequately inform the new institution about what a student has already done and how well he performed in a given course he may be seeking exemption from. In that regard, Brown (2002: 228) states that "...portfolio can be used for admissions, placement, course exemption, or to gain credits to facilitate degree completion". Based on the evidence in the form of portfolio contents, a new institution would then take a decision on whether or not to exempt the student from the said course. A portfolio may also be informative to potential employers about a prospective employee's knowledge. However, students are reminded that in the case whereby a portfolio is to serve as a marketing tool for employment, they are at liberty to select their best pieces of work that adequately reflect what they have covered in their programmes of study.

The nature of the portfolio adopted in the Technical Writing course is a 'hybrid' portfolio model. It takes into account aspects of both a simple portfolio and a complex portfolio (Dysthe,2002). The former consists of three papers written by students on self-chosen topics, collected in a portfolio and graded by an external assessor. In the latter, a student selects his best pieces from the various assignments done in the course and presents them in a portfolio for assessment. In the present case, a portfolio is not the sole course assessment graded by an external examiner like at a university in Norway (Dythe, 2002), but it is part of the continuous assessment. It comprises all the written work - be it assignment, test, or quiz. In addition, a special assignment is given that gives students an opportunity to engage in research, work as a group, discuss during tutorials with a Teaching Assistant as a facilitator and shape the assignment into a well-crafted piece. The kind of portfolio students are expected to produce is similar to what Brown (2003: 7) refers to as a practice-oriented portfolio that consists of "a range of small tasks throughout the learning programme to ensure that participants are actively engaged in learning activities that can culminate in the final assessment." Brown (2002: 229) further states that "some undergraduate portfolios include a compilation of students' work and progress in writing classes during all or a portion of their academic careers". The grading is done by the substantive lecturer; and the mark obtained from the portfolio counts towards a student's final coursework assessment mark. In Botswana, practice in coursework grading is very similar to the British practice because we largely follow their system of education due to our historical ties with that country. In Britain, the coursework assessment is "... a collection of assignments, formulated either by an external exam board or by the teacher and done by the student throughout the whole course ... usually combined with traditional written examination (Dysthe, 2002 : 1)."

A portfolio has two types – an electronic portfolio or a paper-based portfolio. The former, also known as an e-portfolio is a collection of evidence compiled and kept as an electronic copy by a student, usually on the web. It normally contains typed data and images, including electronic files, multimedia, blog entries, and hyperlinks which may guide the user to relevant websites (California State University, 2015). A paper-based portfolio is simply a hard-copy portfolio with similar contents as an electronic portfolio, except it may have additional attachments of marked students' tests and assignments which may have been hand-written. Its limitation is that it may not use multimedia, blog entries and the reader may not immediately follow hyperlinks to reach relevant websites. While there is a noticeable shift from the use of paper-based portfolios towards the use of electronic portfolios (van Wesel and Prop, 2008), in the case under discussion, a paper-based portfolio is the most preferred because portfolio creation is new. Once students have mastered its production, they shall be introduced to an e-portfolio. In addition, very good portfolios are selected and kept in the Technical Writing

Centre for use by future students. A paper-based portfolio is also seen as a tangible product that a student has produced. On the contrary, an electronic version has limitations in that it would not allow students to easily include other pieces of work they have produced such as tests, classwork or quizzes and assignments. A complete portfolio should give students an opportunity to visibly see their performance and progress in the course (Challis, 1999).

2.1 Conceptual framework

The conceptual framework of this study was derived from the co-constructivist approach by Klenowski, Askew and Carnell (2006). 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. Through a portfolio creation, students were given an opportunity to comment on their learning and make recommendations on how their learning can be improved for optimum results. This is done through students' evaluation of each course module; that is, the module content and how it was delivered. Through their evaluation, students are given an opportunity to comment on the quality of the course-content and its delivery, and the extent of learning in line with Askew and Lodge (2001: 11)'s contention about the co-constructivist approach that "learning, in this model involves reflective processes, critical investigation, analysis, interpretation and reorganisation of knowledge". The students' feedback informs lecturers on how to improve the course and mode of delivery to ensure that course objectives are met.

3. Research problem

In discussing the theme of this paper, two fundamental questions were addressed:

1. Is portfolio creation an effective tool for the teaching and learning of the TW Course?
2. Is portfolio an effective assessment tool in the TW course?

The researcher had realized through her experience at her previous institution and at the current institution that students failed to appreciate that topics they learn under each module of a course contribute to the overall understanding of the course. A module is defined as "a self-contained fraction of a student's workload for the year ... [which] carries a unique examination / assessment mark" (University College Cork in Ireland). Students viewed these topics as isolated entities and could not make a connection between them. Furthermore, students were interested in the mark they obtained in each written work and not in why they were awarded that mark, and where they went wrong. A portfolio was therefore meant to visibly show the connection between topics and between modules since it will be a tangible record of what students have learnt. Students also lacked self-organization skills; therefore portfolio creation was seen as a way of imparting these skills to them. Brown (2002: 228) states that "through portfolio creation, students are able to enhance their communication and organization skills."

Portfolio creation was also specifically used to teach report-writing as one of the writing activities that undergraduate and graduate engineers engage in at university and at the workplace respectively. For instance, at University of Porto in Portugal, students on the Master in Mechanical Engineering course were required to produce a detailed technical report based on the task they were given (Lino and Duarte, 2011). In the case under discussion, a feasibility report was chosen for this purpose. In addition, it was hoped that report-writing would give students an opportunity to apply the Information Communication Technology (ICT) skills they have acquired to produce a large document, including formatting it correctly. Report-writing requires competence in computer application skills, just as Barlett and Sherry (2004) and Wade, Abrami and Sclatter (2005) similarly observe about e-portfolio production, that it increases ICT competences.

Portfolio creation also involved giving students an opportunity to evaluate their own learning. Self-evaluation by learners is important because according to Brown (2002: 230), several studies show that "learning takes place through an act of insight. ... Insight may occur through reflecting on and writing about ... personal experiences and results in greater self-knowledge. "

As learners engage in and reflect on their personal experiences in the course and write about them, they end in greater self-knowledge. Brown (2001) refers to the use of a portfolio as a 'self-reflective tool', 'a conduit connecting learners to the theory base of higher education' or 'a reflective bridge'.

Students were also required to evaluate their lecturers' teaching of the course. However, this exercise has generated some mixed feelings among lecturers; some do not object to it, but others are not supportive of it. The main reason for these misgivings is that in some cases, good teachers (teachers who know their subject matter) get bad ratings; and bad teachers (teachers who may not be competent) get good ratings (Stark, 2013). Consequently, for fear of bad ratings, pedagogical innovations are stifled and lecturers end up watering down course content in pursuit of good ratings (Stark, 2013). However, the importance of this exercise cannot be over-emphasized since it gives students an opportunity to have input in their learning in line with the co-constructivist approach (Klenowski, Askew and Carnell, 2006), which encourages learners to identify and comment on issues that affect their learning and to strive to influence change. Similarly, the students' feedback informs lecturers about the quality of the course content, what was well-learned from the course, and what the lapses were in teaching. Consequently remedial action would be arranged.

Overall, an extended writing in the form of the production of a feasibility report, students' evaluation of their own learning and evaluation of the course content and teaching that were part of the production of a portfolio, were seen as an opportunity to improve students' writing skills, which was the main aim of the course. Assessing the portfolio content and quality was therefore, assessment of the students' writing skills.

4. Methodology

The study was theoretical and empirical in design and the qualitative research method was used to gather the data. A case study approach was used because it allowed for in-depth investigation of the data at hand (Leedy and Ormrod, 2005; Mouton, 2005; Stake, 1995). The study involved 118 second year undergraduate students enrolled for various engineering programmes; namely computer engineering, energy engineering, telecommunication engineering, mining engineering and geological engineering. The data were collected for six weeks (from the beginning of April to mid-May 2014). The students worked in small groups consisting of 5-6 students per group. Therefore, focus was not on individual students but on groups and this culminated into 19 portfolios. The portfolio contents served as the data for the study. The students' age ranged from 17-21 years. However, their respective programmes and age were not variables in this study.

4.1 Site

The site of the study was the Botswana International University of Science and Technology (BIUST) in Botswana where the researcher works as a lecturer. BIUST is a new university established in 2009 with the mandate to be a leader in the diversification of Botswana's economy through Science, Engineering and Technology. Botswana's economy is currently based on diamonds, beef and tourism. The government has, therefore, seen the need to diversify the economy so that it also becomes a knowledge-based economy. The university had its first students' intake in August 2012 in the two colleges – College of Sciences and College of Engineering and Technology. It now has three colleges with the recently established College of Information Communication Technology (ICT). Currently, the student enrolment is approximately 1500, with the College of Engineering and Technology having the largest student complement of 800 (BIUST enrolment, 2014/15).

BIUST aims to produce graduates who are not only conversant in their disciplines, but who can also compete nationally and internationally with their counterparts. For BIUST graduates to compete with their counterparts from elsewhere, they need to be competent and confident communicators both in speaking and in writing. Hence the university introduced the TW course in January 2014 to all its undergraduate students. It was during this time that the researcher also introduced portfolio creation to her class, and the data for this study was collected during the same period (before the TW Centre adopted portfolio creation as part assessment for its students). The course is meant to wean students from general English background studied at high school and gradually introduce them to writing for Science, Engineering and Technology. In addition, the course is meant to introduce students to academic literacy skills recognizing that they have little or no clue about how to retrieve, cite and acknowledge sources, which are essential skills in writing at university level. Competence in academic literacy, like competence in communication skills, cannot be over-emphasized when pursuing studies at a university. In that regard, Kerley and Nettles (2010: p2) posit that "when students engage in learning through the acquisition of Critical Academic Literacy skills, they succeed and they persist in education and continue in meaningful relation with all of life." Horning (2007: p73) refers to inability to use the

right sources and cite them correctly as 'critical illiteracy' and states that students "have no sense about appraising a piece of written text for accuracy, currency, relevance, authority... they cannot and do not do it with sources they find on the internet."

4.2 Process

The contents of the portfolio were to serve as the data for the study; consequently, the students were first exposed to the principle of a portfolio in education, what its purpose is, and its design. Creativity in portfolio design was emphasized consistent with one of the objectives of the course: to develop critical thinking skills among students. Students were expected to design their portfolios in such a way that it will demonstrate that they have applied their minds. Then students were provided with a list of what they could include in their portfolios as a guide. They were reminded that the portfolio should be a reflection of all the modules covered in the course. In addition, the students were given a specific assignment on report-writing. Report-writing was chosen as a major task in portfolio creation because it gave students an opportunity to apply the writing skills learned and to engage in extensive writing consistent with the demands of their prospective profession. In that regard, Kreth (2000), states that engineers spend between 20% and 40% of their work time writing. Similarly, Silyn-Roberts (1998) states that newly-recruited engineers spend about 30% of their work time writing; those in middle management spend 50% - 70% of their work time writing; and top management engineers spend between 70% - 90% of their work time writing. A feasibility report was an example of a report selected for inclusion in the portfolio.

A feasibility report is a report normally undertaken when an organization plans to undertake a new project, so as to assess its chances of success. Korewar, & Bhosale (2013: p2) define a feasibility report as "an analysis of the viability of an idea, carried out to assess the viability of a new project, through a disciplined and documented process of thinking from its logical beginning to its logical end." It is conducted to help management make a decision by presenting evidence about the practicality of the proposed project. Based on the evidence, the report recommends whether or not the project should be undertaken. The management of the organization will then reflect on the recommendations made in the feasibility report and make an informed decision about the proposed project. Therefore, a feasibility report allowed the students to engage their critical thinking skills. Critical thinking is a necessary skill for a university student as there is need to think beyond what has been provided. A student needs to apply his or her mind to come up with new information. For instance, Horning (2007: p73) states that students who are unable to think critically are unable to "go beyond summary to analysis, synthesis and evaluation."

The students were taken through the main aspects of a feasibility report, namely; purpose, objectives, scope, costs, manpower and legal requirements. Each group was required to choose a topic on which to write the feasibility report. The choice of the topic was guided by the engineering programme that the students were studying; for instance, students enrolled for the energy engineering programme were required to choose a topic relevant to energy engineering. The same applied to other disciplines - telecommunication, computer, mining and geological engineering. Feasibility report-writing also gave students an opportunity to apply Emig (1977)'s the Writing process, which is a four-stage process comprising of pre-writing, drafting, revising and editing [including proof-reading]. This process enabled the students to write coherent reports because it "continues to serve as the main outline to understand how individuals find ideas and transform them into a creative output (Forgeard, Kaufman & Kaufman, 2013: 325-326). "The Writing Process is based on "Wallas' four-stage model of the creative process: preparation, incubation (during which no conscious work is done), illumination (the "a-ha" moment of insight during which ideas enter consciousness), and verification (Lubart, 2009: 154)."

As students produced the portfolios, they were expected to apply their technical writing skills such as writing in well-structured paragraphs and use of conciseness. According to Pearson (2015:476) Higher Education in Guidelines for Grammar, Style and Punctuation, TW is most effective when it is concise. Therefore it is important to choose words that express ideas precisely, accurately, and crisply. Adherence to correct punctuation, grammar and capitalization is also vital for cohesion and coherence. Students were also expected to correctly apply summarizing and paraphrasing skills. In addition, there should be evidence that their work

had been edited and proof-read. Production of a portfolio, including feasibility report-writing, was done in six weeks. This was characterized by weekly group presentations on progress made on the feasibility report to the rest of the class during tutorial sessions. The idea was to share information and to ensure that each group was on the right track and moving at the same pace, consistent with the spirit of the course, being a knowledge-application course instead of being an information-recall course. The ultimate learning outcome was to ensure that each group produces a product that demonstrates that learning has taken place. Brown (2002) and Van Kleef (2000) concur that portfolio production leads to new learning outcomes.

Overall, portfolio creation gave students an opportunity to work together on a series of tasks within small groups or teams. The Business Dictionary defines team work as the process of working collaboratively with a group of people in order to achieve a goal. In a team, people work towards a common goal, try to cooperate, use their individual skills and provide constructive feedback. Therefore, in a learning environment such as the one under discussion, group work encourages collaborative learning and cross-fertilization of ideas despite any personal conflict that may occur between individual group members due to diverse personalities and thinking. Some criticism was labeled at group work; that it does not give individual students an opportunity to demonstrate their full potential and that it stifles competition. However, there was still competition between groups on production of best portfolio. Furthermore, in this particular instance, group work was ideal due to the large class size. Group work also exposed students to real-world experience where an individual is expected to function within a team consisting of people of diverse thinking and experiences. For instance, Hall (1977) states that during the production of an aircraft, there is a systems engineer who is the team leader and mechanical and industrial engineers who are team members. The mechanical and industrial engineers are involved in designing the machines necessary to fabricate the different parts as well as the entire system for assembling them, while the system engineer combines the contributions made by all the different disciplines.

5. Data analysis

The data were analysed qualitatively to produce a descriptive account of portfolio production and identify learning outcomes that emerged from the process based on the 19 portfolios produced. The analysis of the data was done in two-fold: examining portfolio appearance and the quality of its contents. While the analysis of the portfolio appearance was made exclusively by the researcher as the lecturer, the analysis of the portfolio contents was based on the researcher's judgment and the students' feedback on the teaching and learning of the course. In analysing the data, the researcher identified learning outcomes that answered the two main research questions.

5.1 Portfolio appearance

The analysis of portfolio appearance involved judging the creativity that students displayed in the production of their portfolios. This included information on the cover page, production of a Table of Contents (TOC) and corresponding portfolio contents as well as any graphics used. This gave students an opportunity to apply their ICT skills. In analysing the portfolio appearance, a number of issues emerged: Generally, some groups demonstrated creativity when designing their portfolios. This was evident in the information on the cover pages which instantly gave the reader a complete picture about what the portfolio was about. The TOC generated also demonstrated that the students had a good knowledge of application of ICT skills. The graphics chosen for illustration also aptly corresponded with the content illustrated.

Notwithstanding the positive observations made above about the work produced by some groups, other groups did not put much effort in creativity when designing the portfolio cover pages. For instance, vital information that made it easy to identify each group was omitted. Some groups failed to utilize the use of graphics despite the importance of graphic communication in engineering. Poor production of a TOC also revealed that some groups lacked computer skills since they failed to utilize Word for this purpose; instead they produced the TOC manually. In other cases, where a TOC was generated correctly, it did not correspond with the contents of the portfolio as documents within the portfolio were arranged haphazardly. This demonstrated lack of attention to details not lack of knowledge. The students concerned overlooked the fact that attention to detail is an important skill in effective communication. Therefore, a well-arranged TOC would assist a reader looking for specific information to locate it quickly (Monash University Language and Learning Online). Self-

organization skills were also lacking; some groups submitted portfolios comprising of loose papers instead of well-bound documents. Self-organization is one of the key attributes of a graduate; hence through portfolio development, students increase their self-knowledge, communication, organisational skills and reflective abilities (Brown, 2002; Joerin & Gomes, 1998; White, 1995).

The arrangement of information within the portfolio was expected to follow the sequence of the course outline. This was to guide the students on what topics were covered as they evaluated the teaching and learning of each topic. Students were also expected to come up with a reader-friendly structure in the production of the portfolio. For instance, the feasibility report as the last and major assessment piece within the portfolio should have also been prominently labeled. Furthermore, students were required to include their written work such as tests and assignments as addendum.

5.2 Portfolio Content quality

The analysis of the portfolio content was based on the co-constructivist theory of learning, which emphasizes collaborative learning more than learning as an individual activity (Klenowski, Askew and Carnell, 2006). Klenowski et al. (2006: 269) states that under the co-constructivist theory, "learning involves reflective processes, critical investigation, analysis, interpretation and reorganization of knowledge". Students' evaluations of learning and teaching were key in this regard. The portfolio content comprised three main things. First, it had students' evaluation of each topic under each module, which culminates into evaluation of the entire course. The students commented on the quality of the course content, how it was delivered and its learning outcomes; that is, whether or not they found the course supportive of their learning at university. Second, it had a feasibility report, which gave students an opportunity to apply Emig (1977)'s the Writing process. Third, were the students' marked assessment pieces (two tests and an assignment).

The students' written evaluations were to demonstrate two main things: First, the level of the students' writing skills; second, whether learning and teaching had taken place. Students' evaluations contributed to the lecturer's assessment of portfolio contents and award of marks consistent with each group's performance. Arter and Spandel (1992) refer to these evaluations as reflective commentary. In the 'reflective commentary', students gave a brief account of what they learnt from each module, in the entire course and what they found problematic. The 'reflective commentary' was meant to give students a voice in their learning because they are "required to reflect on learning, [as well as teaching] and assessment practices (Klenowski et al. (2006: 269)". As they provided the 'reflective commentary', students were expected to critically reflect on the teaching and learning by "going below the surface of memory, to identify learning derived from specific experiences and to articulate when, why, and how it was applied (Boud and Walker, 1992; Merizow, 1990)".

From the writings of the 'reflective commentary', certain weaknesses still emerged; some groups could not differentiate between formal and informal writing. They used colloquial expressions, which are highly inappropriate for formal written communication. For instance, they abundantly used contraction forms such as 'don't', 'won't' instead of their standard versions 'do not', 'will not' respectively. Mistakes in grammar, punctuation, and capitalization were also noted, as well as wrong paragraphing. These affected cohesion within the paragraph and coherence of the entire write-ups.

Concerning the feasibility reports, marking took into account Emig (1977)'s the writing process as the basic structure. The students came up with very impressive reports and demonstrated that learning had occurred. Creative thinking displayed in the proposed projects on which students wrote their reports was also awarded marks. Some of the topics on which reports were written were:

- The use of bank cards to pay transport fares
- The Economic Effects of Remote-controlled and Automated Mining
- Setting up Automated Teller Machines at BIUST Campus

Since the main features of the feasibility report were provided to the students, the marks allocated were based on the quality of information provided at each stage of the report and how it was presented. Assessment of whether learning had taken place was also based on the grades obtained in the previous students' written tests and assignments.

6. Discussion of Findings

The analysed data showed that a portfolio is an effective teaching, learning and assessment tool in a skills-based course like the TW course. The data are conveniently discussed under the two main research questions. The first research question was: Is portfolio creation an effective tool for teaching and learning the TW course? This question is answered through the researcher's evaluation of the portfolio appearance and partly through the portfolio content. From the analysis, to some degree portfolio creation had succeeded as a teaching and learning tool. Some groups came up with well-designed portfolios that aptly communicated what the portfolios were about. Portfolio creation gave students an opportunity to think critically, to become active, independent and self-regulated learners (Pintrich et al. 1993; Bergman, 1994). The feasibility report-writing gave students an opportunity to engage in extended writing and apply their writing skills. They articulated their ideas through the key information in a feasibility report, namely; purpose, objectives, scope, costs, manpower and legal requirements. This was a demonstration that students were able to apply the knowledge acquired. The downside was that it was the first time that the students had produced a portfolio for a university course.

6.1 Students' feedback

From the students' feedback received through evaluation of course content (including its learning and teaching), it emerged that students greatly appreciated the contents of the course. Their comments were positive about both modules– the writing module and the academic literacy module, and therefore, about the course itself. Concerning the teaching and learning of each module and the course in general, students also expressed general satisfaction. From the 'reflective commentary', it emerged that students appreciated the course and found it relevant to their needs as engineers-to-be. The mode of teaching that was employed; being introduction of a topic in the lecture (by the researcher as the substantive lecturer) followed by an activity during tutorials (facilitated by the Teaching Assistant) was greatly appreciated. Tutorial sessions could be in the form of group discussions followed by brief presentations to the rest of the class, or initial written task (individually or in groups) of an exercise followed by general discussion of the task by the entire class. The interactive nature of tutorial sessions seemed to be most appealing to the students. Some of the comments from the groups are reproduced below:

Group A: *"Working in a group was very effective; it made the work to be done easy as each member of the group had a role to play."*

Group B: *"A number of life skills were learnt which will assist students through in professional writing. These skills include report-writing, summarizing and conciseness."*

Another group wrote: *"The presentations helped us to develop oral communication skills and public speaking. The library assignments helped us gain understanding of the library database that are available and use it and electronic resource to search for information."*

Group D: *"This course taught us that concise and clear writing is an extremely important aspect in engineering. We have also acquired a lot of knowledge ... doing this course which involves writing in our disciplines and presentation skills. These skills will truly assist us throughout our university years and later on in our careers."*

The comments above about the course revealed that portfolio creation gave students an opportunity to reflect and assess their learning of each aspect of the course. They felt empowered as each one of them took part in the task of portfolio production. Since portfolio production was group work, it made the task at hand easier and also taught them team work as an important life skill. They also felt they were equipped with communication skills, particularly writing as they stated that they learnt how to write reports, use conciseness in writing as required in technical writing, as well as how to paraphrase other writers' ideas. This is application of information and library skill which is made easier by the use of ICT skills "primarily in the form of the Internet, which significantly simplify the exchange of information, knowledge and skills (Masic, 2013: 148)." It also emerged that since portfolio creation also involved research, it gave students an opportunity to apply information search skills and facilitated their better understanding of the library database. Because groups were also required to make periodical presentations as they worked on the feasibility report, students also expressed that the presentations sharpened their oral presentation skills, which they need in their studies and

beyond. They stated that they are required to make oral presentations in other courses and eventually when they join the world of work, they will also be expected to periodically make presentations during meetings, seminars, workshops and conferences. Živković (2014) states that oral presentation skills prepares students to function successfully in the future professional surrounding, and preparing them for their possible further academic career.

Notwithstanding the positive views above, the students also expressed displeasure at not being provided with notes on some topics and that where notes were given, they were not sufficient. The decision not to provide students with notes in some instances was deliberate on the part of the lecturer. Students had earlier been trained on note-making and note-taking skills. Therefore, they were expected to practice and perfect these skills by taking down notes during a lecture and making their own notes after the lesson through research to supplement the brief notes that had been provided. The non-provision of detailed notes on some topics was a way of encouraging students to apply the academic literacy skill of information search. At university, students are autonomous learners; therefore they are expected to be less reliant on their lecturers, and should learn to discover information for themselves.

The second research question was: Is portfolio creation an effective assessment tool in the TW course? On using the portfolio as an assessment tool, the researcher realised that a portfolio is a suitable performance assessment tool for a skills-based course like TW. It allows students to demonstrate what they can do with what they know, rather than how much they know because it calls for application of skills learned rather than recalling what skills were learnt. Through portfolio creation, students were able to demonstrate that they have mastered specific skills and competencies such as writing, critical thinking, research, application of ICT skills and referencing. A portfolio also enabled the researcher to see the student's work not as separate pieces but as one unit since it comprises the key work done during the course. It also gave a true picture about students' performance and ability. Hence it is regarded as an authentic assessment because it allows students time to plan, complete the work, revise, consult with others and to self-assess. Consequently, the final grade awarded on continuous assessment is deemed authentic since it is based on authentic assessment. Wiggins (1990) suggests that the authenticity of an assessment is determined by three factors: the task, the context, and the evaluation criteria.

Assessing students' writing also became evident from the marked written pieces included in the portfolio. The variety of the types of written tasks that were given served as evidence of what students were able to do or not able to do. Where students demonstrated weaknesses, remedial teaching was arranged in the following semester. Thus portfolio creation reveals whether or not the level of communication the students have reached is consistent with one of the objectives of the university that its graduates should be ready for the market once they complete their studies (BIUST prospectus, 2014/2015). The assessment mark awarded each portfolio therefore, reflected the level of communication competence for the members of each group.

7. Limitations

Whilst the portfolios produced showed that learning of the course had taken place, the major limitation was that due to the large class size, portfolios were produced in groups instead of by individual students. As a result, students' individual capabilities were not clearly revealed. This approach stifled individual creativity and competition between individuals. However, there was still evidence of competition between groups. Another limitation was that because portfolio creation was introduced half-way through the course, students did not spend as much time as they would have liked on the task. Furthermore, students had to rely on their recall skills to evaluate the modules covered before the work commenced on portfolio creation. A more ideal situation is for students to evaluate each module soon after it had been covered. In addition, it was for the first time that the students were engaged in the production of an educational portfolio.

8. Study Implications

Despite the limitations articulated above, this study has some implications. First, it became evident that portfolio creation gave students an opportunity to apply the language skills learnt. Therefore, it is an authentic assessment and should become an integral part of continuous assessment for the TW course.

Second, portfolio creation should be introduced at the beginning of the course, not half way through the course as it was the case in this study, to give students adequate time to execute the task. Third, portfolio creation as a way of assessing teaching and learning can be adopted by lecturers of other courses, especially engineering courses since they are generally practically-oriented.

9. Conclusion

An educational portfolio is an appropriate tool to evaluate the learning and teaching of a TW course. It is also an appropriate tool for assessing students' performance. By going through the tasks that students have been given and noting their performance, the lecturer gets a clear picture of the strengths and weaknesses of his students. When reading their comments about the course content and modes of delivery used, the lecturer also gets to know if the course meets the expectations of the students and if the modes of delivery used were effective. Therefore using a portfolio to assess students' performance in TW gives an opportunity to assess a number of skills such as writing skills-especially report-writing, organizational skills, research skills and ICT skills. Furthermore, because the students are required to make oral presentations as they progress with research on the report-writing task given, oral communication skills are also sharpened. Their confidence in speaking before an audience is also boosted.

10. Recommendations

Based on the conclusions reached about portfolio creation in education, it is recommended that portfolios be adopted as part continuous assessment pieces for the TW course in both first and second years of the course. The idea is that by the time students complete the TW course at the end of two years, they should be conversant with portfolio production. However, portfolio creation should be introduced as soon as the course begins not half-way through the course as it was the case with the group in this study. Each student should have a copy of the portfolio created so as to showcase what they have learnt in the course. Furthermore, class size permitting, students should produce portfolios individually instead of in groups. That way, each student's capability will be revealed.

It is also recommended that other courses and / or programmes in the university should adopt portfolio creation as part assessment of their courses. Each college in the university should make it mandatory for their students to produce a programme-based portfolio which could serve as evidence of what each student has studied. These portfolios can serve as marketing tools when students graduate and start looking for employment. Alternatively such portfolios can also be useful when some students who may wish to become entrepreneurs apply to government for financial assistance to set up their own businesses.

Furthermore, portfolios may serve as evidence of what a student has done in a course or programme when they transfer from their current university to another one. Farr (1990) notes that in the United States of America, portfolios are now used as part of entrance requirements in many colleges and universities. The portfolio would inform the new university about the student's capability and decide on their level of entry on the programme. In the case of a course, the new university may use the contents of the portfolio to decide whether or not to exempt a student from a particular course. Once portfolio creation becomes a standard requirement for each programme, and not only for the TW course, the students will undertake the task with the seriousness it deserves. Furthermore, once new students learn from graduates of BIUST about the usefulness of a portfolio for job-search and for fund-seeking, the graduates-to-be will endeavor to produce quality portfolios that will be impressive to the prospective employers and project financiers.

In conclusion, through this study, the researcher has demonstrated that portfolio creation can be used successfully as a teaching and assessment tool for a TW course. Further, its usefulness in education extends beyond the classroom. By demonstrating their competence in TW, the BIUST graduates would be fulfilling the university's mission of producing graduates who are globally competitive, employment ready, have the potential to establish themselves as entrepreneurs and can contribute to employment creation (BIUST Academic Calendar 2014/15).

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