Technology in Learning: Blackboard Usage & Its Impact on Academic Performance; A Case for Universities in Lesotho

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Abstract— The objective of this study is to engage in a practical analysis that will investigate the effects of using Blackboard Learn as a learning platform for higher education students in Lesotho using Botho University as a case study. A mixed method approach was adopted for the study. Data was collected using in-depth interviews and a questionnaire from 132 participants randomly selected for the quantitative aspect and 30 participants purposively selected for the qualitative aspect, from a sample size of 162 in three faculties. Content analysis was used to evaluate the data from interviews. The results have shown a positive impact of Blackboard on students' performance. The findings reveal that Integrative and Dynamic Blackboard are more suitable for enhancing students' academic performance at all levels. The results of the study can be used to encourage other institutions of higher learning in Lesotho to begin implementing Blackboard for improved academic performance.

Keywords— Blackboard Learn, learning Outcomes, LMS, Student Academic Performance.

I. INTRODUCTION

BLACKBOARD has become a popular learning tool which focuses on the students' learning needs. It is defined as an online learning management system tailor-made for online programs that allow students to learn from anywhere, anytime around the world [10]. This learning management system also provides a platform for instructors to upload all learning resources which students can access online in an effort to enhance the learning and teaching process.

However, as previous studies have revealed, implementing technology can be influenced by a user's perception of the system and attitude. As a result, successful implementation of the learning system depends on the students' and instructors' preparedness and their ability to accept the system [1]. Technical and cost issues have also seemed to be a hindrance in successful Blackboard implementation in most education systems. It has been observed that some universities and colleges are implementing Blackboard for the sake of technology and prestige. Blackboard is intended to address the students' needs in order to achieve the objectives and the intended student learning outcomes. In essence, blackboard is a technology driven application.

Many universities and colleges around the world pride themselves in using Blackboard to track and review the progress of students so as to enhance their performance [8]. Reflecting on one's work provides room for improvement. It is very crucial to monitor the students' academic performance both the achievements and the failures so that appropriate mechanisms for improvement can be put in place.

II. OBJECTIVES

The author figured out that only one institution has implemented a learning management system *(Blackboard Learn)* fully throughout the country in Lesotho, that is, Botho University. Nevertheless, for colleges and universities in Lesotho, nothing is established on the impact of learning management systems on learners' performance, in particular, Blackboard Learn. Therefore, the study is carried out to fill this research gap in the context of Lesotho. In light of this, the main objective of this study is to investigate the effect of Blackboard on the academic performance of the students in higher education in Lesotho.

The study had the following research objectives:

- *To examine the impact of Blackboard on student academic performance*
- *To identify the effect of learning materials uploaded on Blackboard in enhancing performance*
- *To establish whether Blackboard use can motivate students to be constructivists in knowledge building.*

III. RESEARCH QUESTIONS

The following research questions were derived from the objectives above;

1. RQ1- How does the use of Blackboard account for the success or failure of students during examinations?

2. RQ2- Do students benefit from the learning resources uploaded by their instructors on Blackboard?

3. RQ3- Can Blackboard usage stimulate constructivism and collaboration among the students in various Faculties in the institution?

IV. BACKGROUND

Technology has drastically changed how businesses operate in the 21st century. Of course, commercial enterprises were on the forefront in integrating day to day business activities with technology. Nevertheless, the education sector was not spared by technological changes either [15]. This was the beginning of educational technology where the education system began to implement learning management applications. Blackboard

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Learn is one such technology-driven application for managing the learning and teaching process of the 21st century whilst taking into account the students' needs [10]. It is important to have a clear understanding of how such learning management systems impact on academic performance since there is a rapid growth on Blackboard implementation by many institutions of higher learning across the globe [6].

Blackboard does not only provide learning resources for both off-campus and on-campus; it also presents a virtual platform to the traditional-oriented study [3]. In principle, Blackboard advocates for blended learning, combining both online and on-campus elements [11]. Technologies like Blackboard are geared to revamp the way students learn [5]. This learning management system provides a highly engaging and interactive system which is flexible more especially that it can be customized to suite an individual student's needs [9]. If well implemented, Blackboard has the potential to change the learning and teaching process completely.

The Blackboard learning management system provides quite a number of educational and social benefits. Benefits may include sharing of useful ideas from a wide geographical area through use of Blackboard features that include discussion forums, announcements, wikis, live chats, virtual classrooms and email. The system has high availability, prompt feedback from instructors and peers. Students can build social and communication skills as they engage in the use of blackboard. Above all, students quite appreciate the flexibility in the system as it allows them to be owners of their own content. This builds confidence in the students and enhances performance as they are forced into deep learning.

The beauty of Blackboard is that it is not restrictive. Students can access learning resources from anywhere around the world even in the comfort of their homes, as long as internet access is available [5]. With the introduction of cheap Smart phones manufactured in China for the African market, it has become more convenient for the students to use Blackboard anywhere as they can afford at least a smart phone. The developers of Blackboard have capitalized the emerging of smart phones by developing a Blackboard application that is compatible with all smart phones called "*Blackboard Mobile*".

Student-centered approaches that are driven by technology offer effective learning experiences. These hybrid approaches promote constructivism learning theory that supports construction of new knowledge from peer-to-peer and student-instructor interactions. Learners can build new knowledge from their peers' ideas as they engage in discussions through Blackboard features like live chats, discussion forums, virtual classroom and other collaboration media like wikis. In this context, the instructor is a facilitator who provides clarifications from discussions and debates, as well as extensifying interactions at the social level.

However, the Blackboard system has some limitations. One of the most challenging issues in Blackboard use is acceptance by users. Some instructors are truly challenged by technology to the extent that they become demotivated to learn how to fully and effectively make use of Blackboard for academic enhancement. They begin to view the system as a waste of time and energy [6]. Nevertheless, despite the fact that learners see Blackboard as a convenient learning tool, the

system does not accommodate the social aspect of the teaching and learning process. There is no direct communication between the learners and instructors [8]. For example, a learner might have questions which need prompt clarification on certain concepts. So lack of prompt feedback on issues of concern actually hinders progress in the learning process.

V. CONCEPTUAL FRAMEWORK

In this study, the main aim is to investigate the impact of Blackboard usage on students' academic performance in various faculties in the institution, using qualitative and quantitative data. The study adopted the Blackboard-Student-Performance model of [8], for "Accounting students", as shown in Fig. 1

The model identifies three types of blackboard that will be examined, that is, Static, Dynamic and Interactive Blackboard. Also five categories of student academic performance are identified in this model that will help define the effect [8].
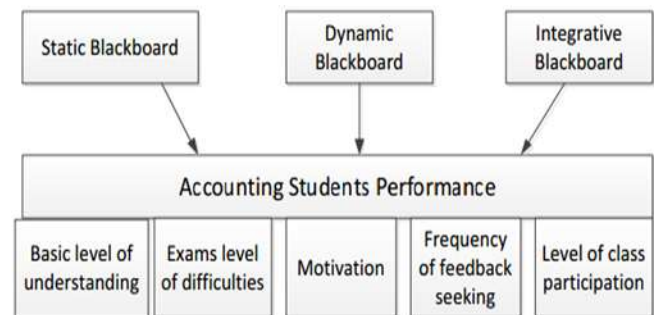

Fig.1 Blackboard-Student-Performance Model
Source: Laurence Lawson-Body et al. 2015,
http://www.iacis.org/iis/2015/2_iis_2015_209-216.pdf

A. Static Blackboard

This is the informative component of Blackboard that informs users about anything on the courses being undertaken through features that include announcements and publications. Static Blackboard has many tools that can be used by both learners and instructors [13], including notifications, announcements, tasks and the calendar. As learners and instructors interact with the Static Blackboard, they can read, print and download content posted on it for offline use.

B. Dynamic Blackboard

This is the interactive component which is inclusive of all the functions of the static Blackboard. It basically encompasses the components that allow learner-instructor interactions in seeking clarifications and sharing opinions via live chats [17]. On the other hand, it can be used for peer-to-peer collaborations through tools like wikis and discussion forums. Above all, interactive Blackboard is the basis for building communication skills and the constructivist learner.

C. Integrative Blackboard

This component allows for integration of Blackboard with other external applications. It contains all the functions in the Dynamic Blackboard and in addition, has the flexibility to integrate with other software like Prometric test engines.

Learners can sit for online examinations on Blackboard. Grading of the examinations and reporting the results in grade center is done automatically by Blackboard [2]. Software like Adobe Connect Professional can be connected to Blackboard for real-time synchronous lectures online with both online students and those on campus. Of course, there are some limitations with this type of Blackboard. Issues like plagiarism, learner's dedication, security in terms of data confidentiality and authentication are a threat to this platform. Learners' safety in their learning process must be of uttermost importance as they engage on Blackboard.

D. Integrative Blackboard

Academic performance can be defined as a method of measuring the ability of the learner expressed in terms of ranking. Previous studies have articulated student performance to final grading of examination scores in a particular course [12]. Other studies have measured academic performance using GPA (Grade Point Averages) to rank learners. For this study, both quantitative and qualitative data will be used to reflect how Blackboard usage can be a contributing factor to the success or failure of learners across all faculties in the university. To be more specific, the author will adopt the five categories of academic performance defined earlier in the conceptual framework as predictors of success or failure.

VI. METHODOLOGY

This study is undertaken using mixed method approach to achieve the aim of this research. The study utilizes the quantitative and qualitative approaches. As asserted by [7], a mixed method approach refers to the process of conducting research by linking data from different approaches in a single study to provide answers to research questions. The benefit of such an approach is that it has the potency to counteract the flaws of both qualitative and quantitative techniques. Thus, the author adopted this approach as it reinforces triangulation in examining the same phenomenon using the two different approaches [18].

A. Population

The study was carried out with a cohort of undergraduates who are pursuing their honours degrees at Botho University, Lesotho campus during the 2015/2016 academic calendar. The cohort had 203 students from all the three faculties (Faculty of Computing, Faculty of Engineering, and Faculty of Business &Accounting) who were in their first year in semester 1 and 2.

B. Sample Population

Participants for this study were randomly selected from all the three faculties at all levels using stratified random sampling for the quantitative aspect. The total number of students at the campus is 203, where the Faculty of Computing has a total of 65 students (approx. 32%), the Faculty of Engineering and Applied Science has 50 (approx. 25%) and the Faculty of Business & Accounting has 88 (approx. 43%). From a total population of 203 students, 162 students were selected as sample population, which is approx. 80% of the total population. The Faculty of Computing provided 52 participants, whilst the Faculty of Engineering & Applied

Sciences provided 40 participants, and the Faculty of Business & Accounting provided 70 participants who were randomly selected based on 60% of the total number of students in each faculty. Stratified random sampling provides an equal chance for each object in the population to be selected for the sample and counteracts biasness. For the qualitative aspect of the study, purposive sampling was used with each faculty providing 10 participants from the randomly selected sample size of 162.

C. Data Collection

Data was collected using a combination of a survey and in-depth interviews. The survey was carried out online. A Google form was used to create an electronic questionnaire that collected structured data via open-ended questions and alternative ordinate of the likert type. The survey was aimed at establishing the effectiveness of Blackboard features and components in enhancing students' academic performance. The total survey responses were 132 giving a 100% response rate. Those selected for in-depth interviews did not participate in the survey so that data redundancy is eliminated. The face-to-face semi-structured interviews were conducted with the purposively selected participants only (10 from each faculty), and these were recorded. Interviews gave room for the respondents' thought, opinion and hypothesis of the effectiveness of Blackboard usage in their learning process. The aim of the interviews was to investigate and appreciate the learners' perceptions of Blackboard and its impact on their learning process.

D. Data Validity & Reliability Analysis

Qualitative Content Analysis (QCA) was used to validate the data collected in the qualitative context. For this study, *Thematic Content Analysis* is adopted as it is a validity measurement tool that can accept huge amounts of data. A reliability analysis was carried out to ascertain the validity and constancy of the objects used for the variables in the quantitative aspect. For this, *Cronbach's Alpha* was used to perform a reliability analysis. According to [19], Cronbach's Alpha values ranging from 0.6 to 0.7 are regarded as the lower threshold of acceptability tolerability. As such, an alpha of greater than 0.7 shows that variables are consistent and they measure the same homogeny.

TABLE I
CRONBAR'S ALPHA

Scale	Cronbach's Alpha
Static Blackboard	0.75
Dynamic Blackboard	0.87
Integrative Blackboard	0.85
Academic Performance	0.89

These results show that the questionnaire is a reliable tool and can be utilized in this study. All Alpha scores are above 0.7.

VII. FINDINGS

The questionnaire asked 27 questions to examine the effect of Blackboard on students' academic performance. Table 2 shows the number of participants who responded to the questionnaire. Analysis of respondents is also viewed based on gender. Fig. 2 shows the gender analysis of respondents:

TABLE 2
SURVEY RESPONDENTS
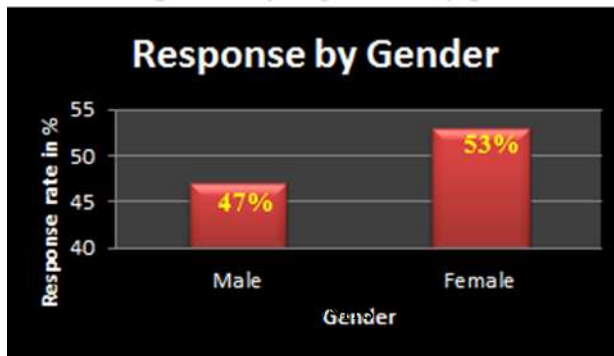
Academic Year	Total Students	Sample Size	%age
2015-2016	203	132	100%

Fig. 2 Survey respondents by gender
Source: Author

A. Internet Access

Since Blackboard is an online tool which only works when internet is available, it is very important to note the availability of internet for learners both in college and outside. This study reveals that 70% of the learners at Botho University can access internet from anywhere anytime. This means there is high availability of the Blackboard application whenever learners wish to use it. Fig. 2 shows the results:
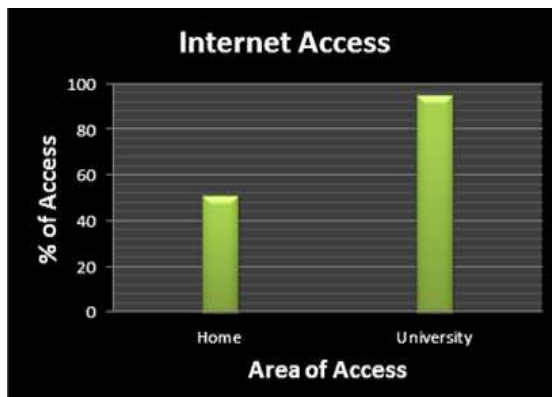

Fig. 2 Survey respondents by gender
Source: Author

B. General Frequency of Blackboard Use

The study has shown that learners in the academic year 2015-2016 have been engaging in the use of Blackboard frequently in their learning process. Prior training on Blackboard usage was given to all students during opening orientation and they are fully aware of the benefits of using the learning management system (LMS). Fig. 3 shows the statistics of Blackboard usage:
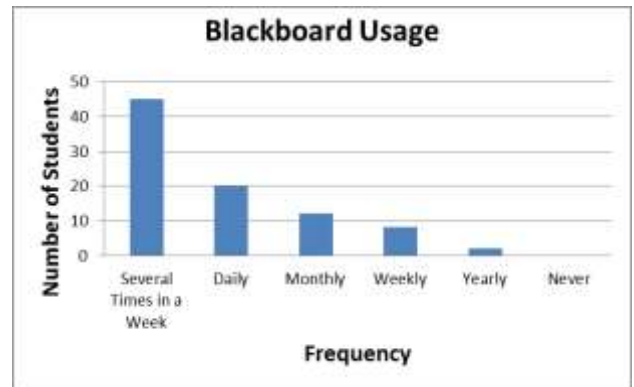

Fig. 3 Frequency of Blackboard Use
Source: Author

C. Static Blackboard Use

The study revealed that there should be minimal use of Static Blackboard to achieve self-discipline among students. It is observed that students do not attempt assignments uploaded because they will be waiting for answer keys to be given. Another observation is that students are no-longer doing further research to make own notes because they will be relying only on lecture notes, slides and video tutorials uploaded for them [8]. To make matters worse, they no longer go for classes as believe strongly on content uploaded for them. Also the results reveal that there is no classroom learning atmosphere established as students engage in the use of Static Blackboard most. There is no conduct with peers or instructors hence frequency of feedback seeking is low.

D. Dynamic Blackboard Use

Findings have revealed that Dynamic Blackboard is very helpful in enhancing student performance than Static Blackboard [8]. The study clearly shows that students enjoy live chats in sharing ideas with peers and instructors. They also appreciate the ability of the platform to provide quick feedback in terms of grading. Communication skills are improved and students are able to build new knowledge from ideas of their peers. This type of Blackboard is very effective in building students to become deep learners who are able to express themselves confidently as the engage in the learning process.

E. Interactive Blackboard

The study showed that integrative Blackboard motivated students to attend virtual classrooms. They are generally contented with real-time virtual classrooms as they provide a feeling of automated face-to-face classroom based learning [8]. However, only students from the Faculty of Computing (20%) had a learning experience of synchronized online sessions.

The use of integrative Blackboard keeps students on their toes and they become active learners. This was a new phenomenon for the rest of the students in other faculties and they have expressed their zeal to also have such sessions using Adobe Connect Professional. See Appendix for Fig. 5 which shows the level of satisfaction with Blackboard use among students on a Likert scale:

IX. ANALYSIS OF ACADEMIC PERFORMANCE

The study examined the academic performance of students based on the mid-assessment scores. See Appendix for Fig. 6 below shows a graph revealing the overall pass rate.

X. CONCLUSION AND IMPLICATIONS

The study seeks to establish whether a correlation exists between Blackboard usage and academic performance. The impact of Blackboard on academic performance was revealed. The study findings showed that use of Dynamic Blackboard and Integrative Blackboard is quite appropriate for all the courses given the nature and level of difficult of courses offered at Botho University. Relying on the data collected, the use of the different types of Blackboard, as highlighted in the conceptual framework, has a strong effect on academic performance of learners. The study establishes that frequent engagement on Blackboard enhances student academic performance. Similar to [16]'s method, this study used course grades to determine how students performed in their mid-semester examinations as they continuously engage on Blackboard during the learning process. Other authors in the likes of [14] used the grade point average (GPA) of students to represent academic performance ranks.

As for practical implications, the findings from this study are very useful for both the instructors and students. The findings also provide the room for instructors to figure out the best Blackboard features that are most suitable for enhancing the students' performance in order to achieve the intended learning outcomes. The results should assist students to appreciate the fact that static Blackboard is less important in improving their performance. Rather they need to engage more on Dynamic and Interactive Blackboard features like discussion forums, wikis, virtual classrooms and live chats which help them boost their academic performance.

The recommendation is that, training sessions on learning management systems for instructors should be mainly focused on how the systems will assist in improving the students' academic performance and achieve the intended learning outcomes. Since this study has revealed that only one institution in Lesotho, Botho University, has fully implemented a learning management system, it is also recommended that the results of this study be shared with other higher institutions of learning in country so that they can be lured into implementing such kind of learning management systems like Blackboard Learn that can benefit them by enhancing students' academic performance and create a competitive advantage in this global market. There is also need to conduct research on how the academic staff perceive the impact of Blackboard usage in enhancing their teaching which is not within the scope of this research.

Finally, further research is required to measure the impact of Blackboard usage on academic performance making a comparison on the mid-semester grades and end semester grades to fully appreciate the impact as educational technology is ever evolving at a rapid rate requiring institutions to keep updating their education systems with the latest learning technologies available.

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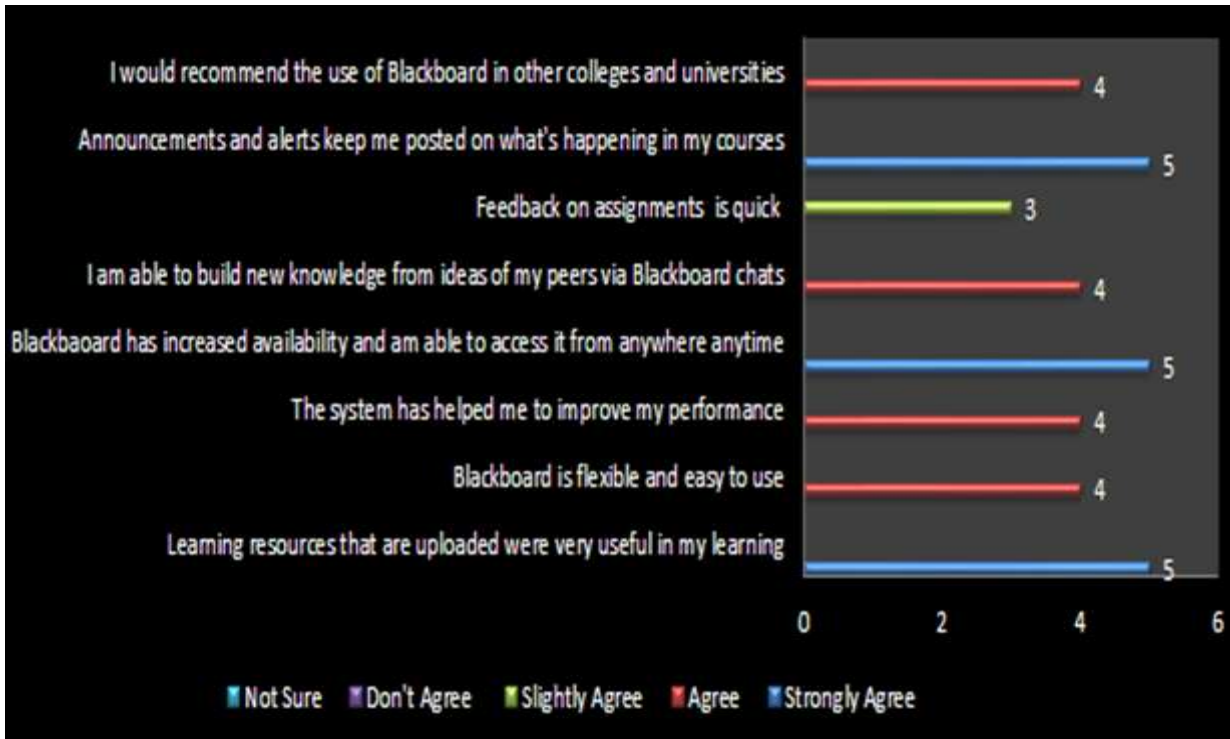
APPENDIX

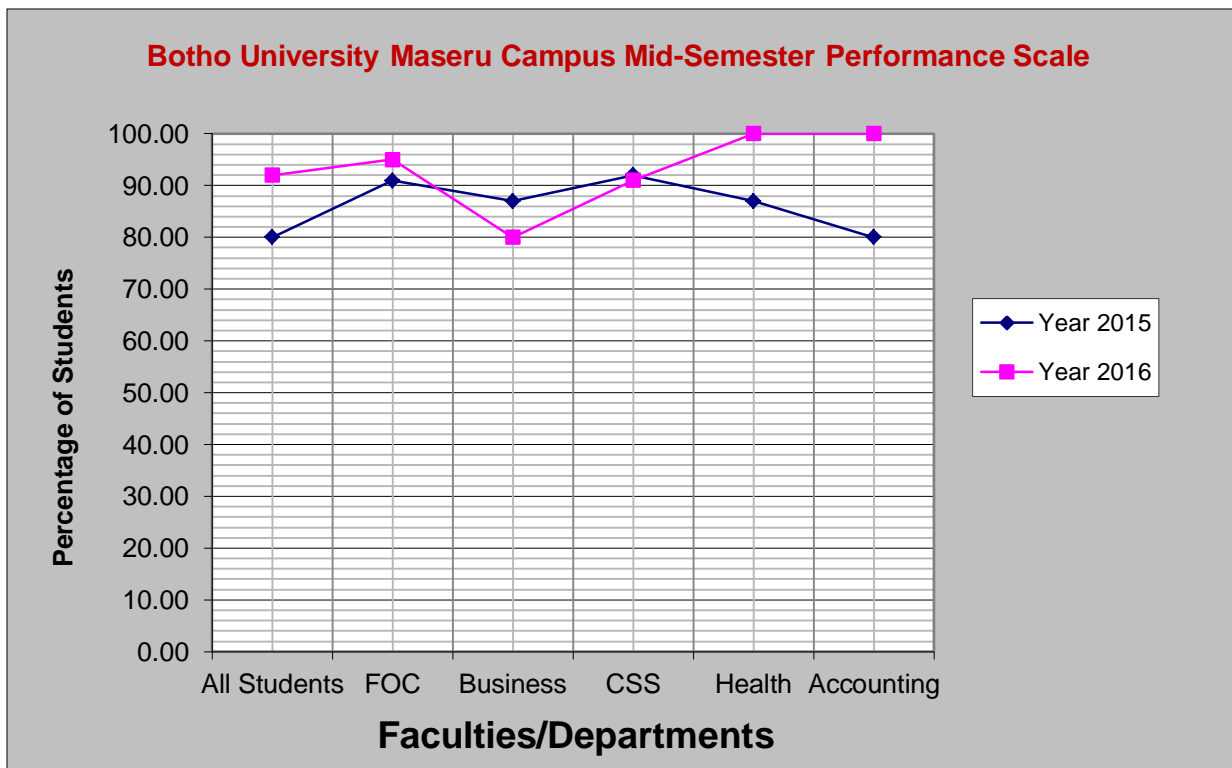Fig.5 Level of Satisfaction on Likert scale of 0-5
Source: Author

Fig. 6 Overall Academic Performance Analysis graph
2015/2016 academic year including pass rate by Faculty/Department
Source: MIS Department Botho University Lesotho Campus