

**ANALYSIS OF INFORMATION TECHNOLOGY SYSTEMS FOR
ACCREDITATION OF UNIVERSITY AFFILIATED INSTITUTIONS**

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Abstract

The importance of information and communication technologies (ICTs) in education and health cannot be over emphasised. Technology use has permeated areas of learning, teaching, research, and socio-economic aspects of our lives. The purpose of this study was to evaluate quality of programs offered by the institutions affiliated to the University for Accreditation Purposes. The study explored four (4) main sections; namely, availability of computers and computer laboratories, Internet and Web-based application, Technology Training, as well as Support and Maintenance. A total of eleven (11) institutions across the country were assessed by experts from various fields led by an IT specialist. Experts consisted of members with various professional backgrounds who carried out the assessment and reached conclusions about the status of each institution. The findings revealed that, health training institutions managed by the Ministry of Health were well equipped with technology resources and ICT infrastructure to facilitate educational transformation. The resources included amongst others, computers and computers laboratories. The colleges of education administered under the Department of Teacher Training and Development, were found to be unsatisfactorily resourced. In general, most of the computers were obsolete and computer labs were in a deplorable state. Across all the affiliated institutions it was observed that, more efforts should be put into upgrading bandwidths and coming up with staff development programmes that would equip lecturers with the knowledge and skills of effectively applying technology in their instructional activities. Furthermore, technical support and maintenance was found to be crucial and required immediate attention to avoid high risk of technical breakdown.

Keywords: Information and Communication Technologies, institutions

Introduction

The importance of information and communication technologies (ICTs) in education and health cannot be over emphasised. Technology use has permeated areas of learning, teaching, research, and socio-economic aspects of our lives. It is therefore in this regard that Higher Education Institutions (HEIs) in Botswana have to equip students with the 21st century skills such as ICT, critical thinking, life-long learning, problem solving, team work, to mention but a few. Lecturers

in HEIs need to adopt innovative teaching strategies which are more student-centred and technology based. However, for technological transformations to take place in HEIs computers and computer labs, Internet and web-based applications must be accessible. Furthermore, the lecturers should be trained to integrate technology in their instructional activities, and students should be equipped with technology skills to help them learn better. Lastly, the institutions are required to provide adequate technical support and maintenance. Literature indicates that absence of ICT infrastructure, lack of lecturer ICT skills, old or poor maintained hardware influence adoption and integration of technology into learning and teaching (Buabeng-Andoh, 2012; Kafyulilo, Fisser and Voogt, 2016). It is therefore essential that all these factors should be considered when assessing the situation of technological resources and its utilisation in HEIs.

The Purpose

The purpose of this study was to determine the quality standard of health training institutions and colleges of education in Botswana as a requirement for awarding accreditation status for affiliation with the University of Botswana. The focus was on four (4) main sections, namely, availability of computers and computer labs, Internet and Web-based application, Technology Training, and Support and Maintenance.

LITERATURE REVIEW

The benefits of technology in healthcare and education have been observed in education and health. It is without doubt that medical technology is absolutely necessary in people's health, taking into consideration its applications in surgical techniques, telemedicine, nuclear medicine and the ability to accumulate electronic health records of vital signs and other critical patient data into one centralized area (Banova, 2013; Sun, Kim, Heo, Kim, Hwang, Yom, and Kang, 2014). Banova (2013) argues that nowadays, there are different types of methods of imaging that allow health practitioners to examine a patient's body structure and other parts without having to carry out complicated and dangerous procedures to form a diagnosis. Furthermore, medical practitioners who are working in clinics and hospitals use technology to record important patient data and keep electronic health records which are being kept in databases that can be accessed from anywhere. Therefore, technology is having a positive impact in the quality of people's health and safety.

In HEIs, the use of technology has not only changed thought patterns and enriched existing educational models. Availability of technology has facilitated development of new training models, and added value to the process of learning, organization and management of Educational institutions. These models share features of a technology-based training and suggest new learning methods in which a student plays an active role and emphasizes self-directed, independent, flexible and interactive learning (Talebiana, Mohammadia and Rezvanfara, 2014). It is therefore necessary for Lecturers to realise and harness the potential of technology in order to improve the quality of learning and teaching. According to Mandal and Mete (2012), technology may be used to deliver and or share content; to communicate between students, lecturers and the outside world; to create and deliver presentations. It is extensively used for

academic research including administrative support and student management processes. HEIs in Botswana should adopt technology based teaching and learning approaches which in principle are in-line with philosophies and pedagogical approaches of the outcome-based education advocated by Botswana Qualifications Authority (BQA). However, for technological transformations to be successfully adopted in HEIs, the ICT infrastructure, leadership and management, academic staff and students, and ICT policies have to be taken into consideration. Each of these components is unable to stand alone. There is need for a strong support from each other if ICT for education is to be adopted (Tongkaw, 2012). Tongkaw (2012) argues that problems such as the policies, culture and general lack of support from government are firmly established and need strong and consistent advocacy to bring about technological reforms.

ASSESSMENT PROCEDURES

The situation of technology resources in health training institutions (HTIs) and colleges of education (CoE) was assessed by a team from the University of Botswana. This team included officers from the Ministry of Tertiary Education, Research, Science and Technology, and lecturers from some of these institutions. There were eleven (11) institutions involved in the assessment; seven (7) were health training intuitions while four (4) were the Colleges of education. The process started from the month of April 2017 guided by an assessment schedule shared with experts and institutions that were to be evaluated.

A team consisting of three (3) team members toured ICT facilities in the institutions interviewing staff that was placed at strategic positions to answer questions evaluating the status of technology for each of the institutions assessed. Each expert recorded responses in the evaluation tool provided. Subsequently, each expert rated the scores of all items outlined in the evaluation instrument. The scores were later consolidated to come up with a final rating. Each team reported the findings to a larger team that further compared and contrasted the findings to come up with a final report that was prepared and shared with the staff and institutional management.

Instruments

The data collection method was more qualitative; however, data collection tool had some quantitative items. The tool consisted of four (4) sections that contained fifteen (15) items. The questions explored details about *availability of computers and computer labs, internet and web-based Applications, technology training, as well as technological support and maintenance available*. The items were measured on a Likert scale of *Very Good, Good, Satisfactory, Unsatisfactory, and Not Applicable*. The scale was not assigned numbers because the assessment was qualitative.

Availability of computers and computer labs

The section assessed the availability of up to date computers and computer labs. This sections had four (4) items covering the ratio computers to staff members; ratio of computers to students; existence of computer laboratories that can accommodate at least 20 students; and whether the computer labs were satisfactorily equipped with functional equipment.

Internet and Web-based Applications

This section assessed whether Internet was available and if the institution used web-based applications such as Moodle Learning Management System (LMS). The section had four (4) items which assessed whether staff were connected to the internet and have email addresses; whether students had access to internet; adequacy of IT services in the Library and evaluated Internet facilities and other information services readily available in the Library.

Technology Training

Technology Training was to do with training of both staff and students to equip them with knowledge and skills of using technology. This section had four (4) items which assessed whether students and staff use IT resources as an integral part of learning and teaching. It also evaluated orientation and training of staff and students. Support and functionality of IT resources and availability of training programme were also explored.

Support and Maintenance

This section was on provision of technical support and maintenance of resources available. The section had three (3) items which assessed availability of technical support, conditions of computers, internet status and maintenance.

Ethical Considerations

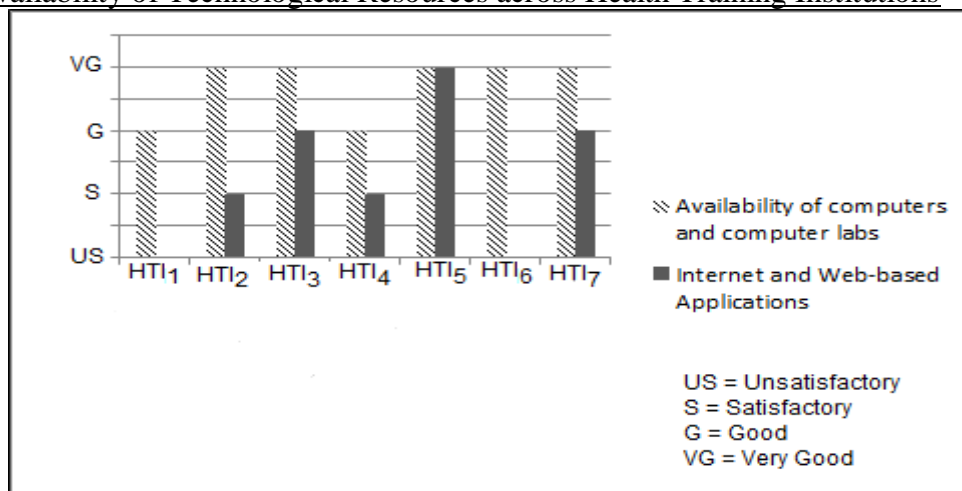
The study was conducted on government institutions and employees, therefore it is appropriate to conform to the principles of research ethics by protecting the confidentiality and anonymity of the subjects. In that regard the names of the institutions involved in the assessment will not be revealed in the study, and instead use codes, for example, a health training institution would be referred as HTS and college of education as CoE.

FINDINGS

**Technological Situation in Health Training Institutions
Resources Availability**

Generally, the situation of resources in health training institutions is satisfactory; computers and computers labs are available and in good condition. The computers are up to date and the computer labs are well equipped with functional computers and related technologies. Fig.1 shows the ratings for each health training institutions in terms of availability of computers, computer labs, Internet and usage of web-based applications.

Fig 1: Availability of Technological Resources across Health Training Institutions



Generally, the availability of Internet and usage of Web-based applications were found to be satisfactory. However, 28.6% of the HTIs were found to be unsatisfactory. This was mainly due to the fact that, the Internet was only available to lecturers but not students. Low bandwidth made usage of web-based applications such as Moodle LMS and Library databases very difficult. It was also found that, in most of the institutions, the radius of Wi-Fi was very limited and not accessible in students’ hostels.

Training, Support and Maintenance

The technology training in health training institutions is relatively good as the institutions ensure that students and staff use IT resources as an integral part of learning and teaching. Students have computer courses to equip them with ICT skills and are given adequate to time to use the available resources. It was evident in all institutions that there were no properly structured IT training programmes for lecturers. Table 2 shows the ratings for each health training institutions in terms of technology training, support and maintenance.

Table 1: Showing Training, Support, and Maintenance

Institution	HTI ₁	HTI ₂	HTI ₃	HTI ₄	HTI ₅	HTI ₆	HTI ₇
Technology training	Satisfactory	Good	Good	Good	Very Good	Satisfactory	Satisfactory
Support and Maintenance	Satisfactory	Satisfactory	Satisfactory	Good	Very Good	Good	Good

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The major concern was found to be support and maintenance. In most institutions, technical support was lacking and IT lecturers had to step in to play a dual role of being a lecturer and a technician. This lack of support inevitably ended up affecting maintenance of equipment and IT infrastructure; it also overwhelms the lecture with additional work that is not financially recognized.

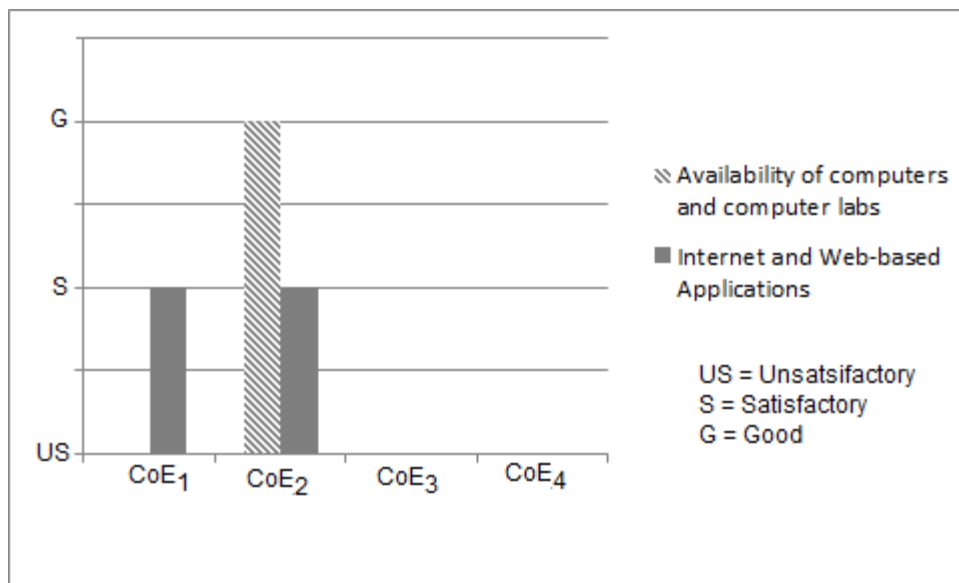
Technological Situation in Colleges of Education

The situation of technological resources in colleges of education (CoE) is unsatisfactory, the situation was even worse in 75% of these colleges. The computers were found to be very old and out of maintenance contract; computer labs were not equipped with functional computers and the labs were in a deplorable state.

Resource Availability

Technological resources in the colleges were rated unsatisfactory CoE₂. Computers were obsolete and needed to be boarded. The computer labs were not equipped with functional computers and the labs were in a deplorable state. Fig.2 shows the ratings for each college of education in terms of availability of computers and computer labs, availability of the Internet and usage of web-based applications. CoE₂ was the only institution that was rated high because the computers were abundant and up-to-date.

Fig.2 Availability of Technological Resources across Colleges of Education



In CoE₁ and CoE₂ colleges of education, the availability of Internet was rated satisfactory, and at CoE₃ and CoE₄ they were rated unsatisfactory. In all these colleges, it was observed that the bandwidth was low and this made usage of web-based applications such as Moodle and library databases almost impossible. The situation was even worse at CoE₃ Education and CoE₄ since conditions of computers were bad.

Technology Training, Support and Maintenance in Colleges of Education

Table 2 shows the ratings for College of Education in Terms Technology Training, Support and Maintenance.

Table 2: Showing Training, Support, and Maintenance

Institution	CoE₁	CoE₂	CoE₃	CoE₄
Technology training	Unsatisfactory	Satisfactory	Satisfactory	Unsatisfactory
Support and Maintenance	Satisfactory	Satisfactory	Satisfactory	Unsatisfactory

Table 2: Technology Training in Colleges of Education

In general, fifty per cent (50%) Colleges of Education were rated unsatisfactory in the area of technology training. This area included questions that explored whether (a) students and staff use IT resources as an integral part of learning and teaching, (b) provided with appropriate orientation, training, and support for use of IT resources and if the institutions had an IT training programme. Fifty per cent (50%) of the colleges were rated satisfactory. Seventy-five percent (75%) of the colleges were rated satisfactory for technical support. However, it was noted that, although support was available in these colleges, particularly CoE₁ and CoE₃, conditions of the IT resources were obsolete and no longer under any maintenance contract.

DISCUSSION

There is a lot of disparity between the health training institutions and colleges of education regarding technological resources. In health training institutions the situation was found to be good, while at the colleges of education the situation was unsatisfactory. In the health training institutions, evidence revealed that, computers of latest models were available and laboratories were equipped with functional computers. However, it was observed that the availability of these facilities did not automatically translate to effective integration of technology in teaching and learning. Web-based applications, such as Moodle, were not used. The reason for non-usage could be that, there are a number of factors that influence use of technology in instructional activities. According to Buabeng-Andoh, 2012; Kafyulilo, Fisser and Voogt, 2016; Mueller, Wood, Willoughby, Ross, & Specht, 2008 cited attitudes, self-efficacy, technology training, and technophobia as some of the barriers to technology usage. Across all the affiliated institutions it

was found that the bandwidth was low and technical and support and in-service training on technology was inadequate.

The assessment revealed that although the Internet was available in almost all the colleges, the bandwidth was very low and this affected the amount of data that may be transmitted over a channel during a specific period of time. A low bandwidth makes downloading and uploading of files very slow; in this case, streaming video and audio becomes very difficult. Literature indicates that, Internet in HEIs has become a necessity in order to enhance teaching and learning (Anderson, Boyles & Raine, 2012; Hattangdi & Ghosh, 2008; Mandal & Mete, 2012; Sarkar and Sukarita, 2012). For instance, the Internet enables new forms of communication and serves many online services in healthcare and education; it enables students to access a wealth of learning materials; and changes the way learning occurs. Therefore, it is crucial that the bandwidths are upgraded in these institutions to enable students to harness the potential of this technology.

In most institutions, technical support was inadequate to the extent that IT lecturers ended up performing dual role. On the contrary, these lecturers were not paid for added responsibility. According Buabeng-Andoh (2012) lecturers are discouraged from using technology because of fear of equipment failure. Besides, if technical support is available, lecturers would be able to use technology in their instructional activities. But again, without adequate technical support, there is likelihood that the computers might not be regularly maintained, which brings about another challenge of technical break down.

The findings revealed that, there is less training of staff on technology in all affiliated institutions. For lecturers to develop confidence and positive attitude towards technology, they need to be trained on it. Technology training would enable lecturers to develop knowledge and acquire technology skills such as Word processing skills, Spreadsheet skills, database skills, web navigation skills, and Moodle teaching skills. Furthermore, technology training should include technology pedagogical training to help lecturers effectively integrate technology in instructional activities. In this regard, Affiliated institutions need to work together with University of Botswana and other stakeholders to develop an IT training programme for staff and students.

CONCLUSION

The health training institutions are well equipped with technology resources and ICT infrastructure to facilitate technological transformations. The resources include amongst others, computers and computers laboratories. However, more efforts should be put into upgrading bandwidths and coming up with staff development programmes that would equip lecturers with the knowledge and skills of effectively applying technology in their instructional activities. Furthermore, technical support and maintenance have been found to be crucial and need to be addressed across all affiliated institutions to avoid high risk of technical breakdown. On the other hand, more efforts should be put in buying new computers and renovating the computer labs to upgrade the quality of technological resources in the colleges of education and higher educational institutions at large. Lastly, these findings can be generalized to institutions of higher

learning managed by government since all the institutions and colleges were included in the sample covered. The findings may not be representative to privately owned institutions and colleges of higher learning.

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