WEB BASED STUDENT INFORMATION MANAGEMENT SYSTEM IN UNIVERSITIES: EXPERIENCES FROM MZUZU UNIVERSITY

Conference Paper · May 2018

CITATIONS
4

READS
19,412

4 authors, including:

Symon Lubanga
Mzuzu University
6 PUBLICATIONS **5** CITATIONS
SEE PROFILE

Winner Chawinga
malawi
34 PUBLICATIONS **421** CITATIONS
SEE PROFILE

Sellina Kapondera
Royal Holloway
15 PUBLICATIONS **44** CITATIONS
SEE PROFILE

WEB BASED STUDENT INFORMATION MANAGEMENT SYSTEM IN UNIVERSITIES: EXPERIENCES FROM MZUZU UNIVERSITY

Symon C. Lubanga
Research Assistant
Department of Library and Information Science Mzuzu University, Mzuzu, Malawi

Winner Dominic Chawinga
Lecturer, Department of Library and Information Science
Mzuzu University, Mzuzu, Malawi

Felix Majawa
Senior Lecturer, Department of Library and Information Science
Mzuzu University, Mzuzu, Malawi

and
Sellina Kapondera
Lecturer, Department of Library and Information Science
Mzuzu University, Mzuzu, Malawi

Abstract

Over the past few decades, universities all over the world have been experiencing new paradigms in the way they handle and manage students' information due to the proliferation of ICTs and its applications such as web-based student information systems. With the adoption of such systems as the Online Student Information System (OSIS) in academic institutions, the experience is that it has now become easy to harness and fast track all students' records in one centralized database via the internet technology. While the benefits of OSIS seem to be cerebrated, it has been a hustle for most universities in Africa to completely go digital in their operations due poor ICT infrastructures that seem to be prevalent in the region. In Malawi, a social survey was conducted with the aim of assessing the Mzuzu University Student Online Management System (SOMS) from the perceptive of students. The study applied the principles of both qualitative and quantitative research approaches. The principal data collection methods were questionnaires and follow up interviews. The study population was made up of third year students in the Faculty of Information Science and Communications and the Director of ICT services at Mzuzu University. The quantitative data collected were analysed and presented using Microsoft Excel Package. Thematic analysis technique was used to analyse the data collected through interviews. The study revealed that Mzuzu University SOMS has one prime service which is online registration and admissions, with online examination results access, student profile and finance as add-ons. The system benefits students as it has cut the time spent during registration periods in every new semester. Students faced the following major challenges when using the system; server loads as more students

concurrently use the system, high cost of internet data bundles and charges, lack of system regular updates and high cost of password recovery. The study recommends that the university through the ICT Directorate should consider addressing the various issues impeding the effective use of the system amongst the student community

Keywords: *Students Online Management System, Mzuzu University, Malawi*

Introduction

Swift transitions in the way institutions of higher learning handle and manage students' information are brought about through technological revolutions, perhaps with the emergence of online student management systems. The concept of Student Management System (SMS) is within a larger field of Information Systems (IS) and it dates back as far early as 1960s (Evangelista, 2011; Marrero, 2009 & Swartz, 2007). Broadly defined, an SMS is "a general information system for maintaining and providing student information and it almost exists in all the schools, colleges, universities and any other education institutions" (Pan, 2004, p.3). Nowadays, SMSs have been described variously as: Student Information Systems (SIS), Student Management Information Systems (SMIS), Student Data Systems (SDS), Student Data Warehouse (SDW), Student Academic Information Systems (SAIS), or Student Information Management Systems (SIMS), Online Student Information System (OSIS) and Student Academic Register Information System (SARIS), (Kaloki, n.d; Maere, 2011 & Paulsen, 2002). Kasozi (2006) noted that despite having various nomenclatures, these information systems serve a similar function and they are all connected to the management of students' information or records in universities or other educational institutes.

In the pre-digital age, managing student's information was done manually, using paper-based systems. However, with increasing number of students in educational institutes, the system could no longer handle student's records effectively. Suffice to say, the dawn of ICT applications and databases presented unparalleled opportunities in managing students' records in academic institutions which gradually lead to the disappearance of paper-based systems. The major concern with manual systems has been the speed with which business operations and decision making processes are carried out in education institutions. Consequently, to cope up with the rise in student's enrolment whilst at the same time ensuring efficiency in their operations, universities had to experience a paradigm shift from using manual student's management systems to online student management systems. Pan (2004) explains that Students Management Systems (SMS) whether manual or online are there to maintain and provide student information in universities and colleges. While specifically, online student information systems depict a centralized virtual database where all

information pertaining students are properly stored in an educational institution (Pacio, 2013). Principally, it is used for management of the most pivotal information about entities such as students, faculty, courses, applications, admissions, payment, exams, and grades (Paulsen, 2002).

Bharamagoudar, Geeta and Totad (2013) opines that an effective SMS provides a simple interface for maintenance of student information. It can be used by educational institutes or colleges to maintain the records of students easily. Thus the creation and management of the most accurate, up-to-date information regarding a students' academic career is of ultimate value to universities as well as colleges. The understanding is that managing student's records manually comes with a lot of challenges. For instance, most of the times information is littered everywhere, can be redundant, inconsistent and collecting relevant information may be very time consuming (Pacio, 2013) as cited in Richard (2004). This development accelerated an automatic switch to online-based student management systems in most universities across the world with the purpose of maximising the benefits from its effectivity to acquire, process, store and retrieve information from the Internet.

Context of the study

Mzuzu University was officially opened in 1999 as the second public University in Malawi after its establishment by the Act of Parliament in 1997. It is located along the Mzuzu-Karonga Main road and is about few kilometres away north of Mzuzu City in the Northern Region of Malawi. The principal mission of Mzuzu University is "to provide high quality education, training, research and complementary services to meet the technological, social and economic needs of individuals and communities and the world". It also centres on the values of "Service, Self-reliance and Perfection" (Mzuzu University Annual Report, 2014). Until recently, Mzuzu University offers both undergraduate and Post-graduate academic programmes to both local and international students. The university as it stands has five faculties and five centres (Student Handbook, 2010). It started with the faculty of Education in 1999, and the following other faculties were later introduced; Faculty of Hospitality Management and Tourism; Faculty of Health Sciences; Faculty of Information Science and Communications (FOISC) and Faculty of Environmental Sciences. The University also has five Centres namely; Centre for Open and Distance Learning (CODL), Centre for Water and Sanitation, Centre for Security Studies Centre for Inclusive Education and Testing and Training Centre for Renewable Energy and Technologies (TCRET). Currently, Mzuzu University (MZUNI) enrolls more than 4000 students in each academic year (Mzuzu university 18th Congregation special report, 2017).

Statement of the problem

The way universities all over the world manage student's information have drastically changed and evolved together with the advent and proliferations of

ICTs. Pacio (2013) argues that changes in Information Technology (IT) allow schools to utilize databases and applications such as Online Student Information System (OSIS) thus, making the accessing of records centralized. However, the establishment of online student's management systems in institutions of higher learning like Mzuzu University posits both opportunities and challenges; to some extent, it remains a half way barrier to some users as they call the electronic machinery a tough game, difficult to cope up with, hence they still remain adamant to effectively utilize the benefits of a new system. At the same time, ensuring a complete migration to such an online student management system seems not possible and raises a lot of concerns among students considering issues such as slowness of broadband internet connectivity the campus is currently experiencing. More so, students are required to access the Student Online Management System (SOMS) from their homes or off-campus where the Internet might be available, slow or very expensive. Consequently, the researchers also observed some irregularities with the new system, for instance timely access to examination results seemed to be a big challenge in addition to registration process which was already forcing some students to pay late registration fees due to failure to go with system. Usually, since the inception of the Mzuzu University SOMS in 2015, there has been no any empirical study to track down its progress in terms of benefits and challenges-let alone the current study address this gap by assessing the system's effectiveness to students. The following objectives were formulated to help address the research problem:

- To identify services offered by the Online Student Management System at Mzuzu University.
- To find out the benefits of an Online Student Management System as perceived by students at Mzuzu University.
- To identify challenges that student's face when using the Online Student Management System.

Literature Review

At the core of every system's efficiency is the availability of services because very often users rate the whole system performance depending on the satisfaction they get in using such services. To meet users' needs and expectations, almost every online student management has a myriad of services. For instance, Maere (2011) explains that the SMS handles the administration part of students which includes; admission, examination records, assessment process, finance, room allocation, transcripts, students union electronic voting, mobile text messaging, examination results feedback. Therefore, it is certain that in most institutions of higher learning, online student management systems are created in house to assist in registration of students, student online profiling, financial recording, examination grades records, transcript generation, student accommodation management, and keeping student records (Maere, 2011; College of Medicine (CoM), 2016 & Mzuzu University Annual Report, 2015).

Asogwa, Mohammed, Ahmed & Danmaitaba (2015) explains that the benefits of Student Management (SMS) software are enormous. In most universities, SMSs directly benefits both the administration and students. To the university management, the SMS carries most of the crucial administrative activities such as admissions, enrolment, and examination (Asogwa et al, 2015; Kaloki, n.d; Kasozi, 2006). On the other hand, Pacio (2013) argues that in recent years, the use of online student information systems provides students with the capabilities to register for new semesters and have timely access to their academic and biographic records via internet enabled gadgets like smartphones and computers. Similarly, EBriks Infotech (n.d) noted that students gain the most from School Management System. Preferably, students get a new platform not only to gain but also to express the knowledge inside them. It was observed that the key benefits of SMSs to students revolves around the 24/7 web-based access to information about class and examination timetables, school events and holidays. It was further ascertained that SMSs allows users to publish articles to share experience, knowledge and views, and participate in discussion forums and therefore this contributes to the digital library.

Asogwa et.al (2015) observed that despite revolutionizing the student information systems, universities in their administrative or academic transaction services, and maintaining student's academic history and profile, paper work is still going on concurrently. Furthermore, Igweonu (2013) also pointed out that inconsistency in power supply, inadequate funding during implementation, inadequate technicians for computer maintenance, and limited access to internet are some of the challenges that locks most universities in the use of Online Student Information Systems.

Methodology

A social survey research design was used in this study. In nature, the study applied the principles of both qualitative and quantitative research approaches. The study population was comprised of students from the faculty of information science and communications and the Director of ICT services at Mzuzu University. In 2016, MZUNI enrolled 4,067 students (Mzuzu University 18th Congregation special report, 2017, p.5), and the sample for this study was composed of 17 Library and Information Science Students and 20 ICT third year students making a total of 37 respondents. The study used non-probability sampling procedures, specifically purposive sampling. Questionnaires and follow up interviews were used to collect data from the purposively selected 37 third year students in the FOISC and the Director of ICT respectively during the data collection process. To add meaning to the data collected from participants, the researchers analyzed it into tables, frequencies, percentages and figures using such a package as Microsoft Excel application. Qualitative data collected were analyzed through the process called thematic analysis. In this process, Braun & Clarke (2006) explains that it is a method which involves identifying, analyzing

and reporting patterns (themes) within data. The researchers interpreted the interview data in the way that it directly answered the set forth thematic areas or objectives of this study.

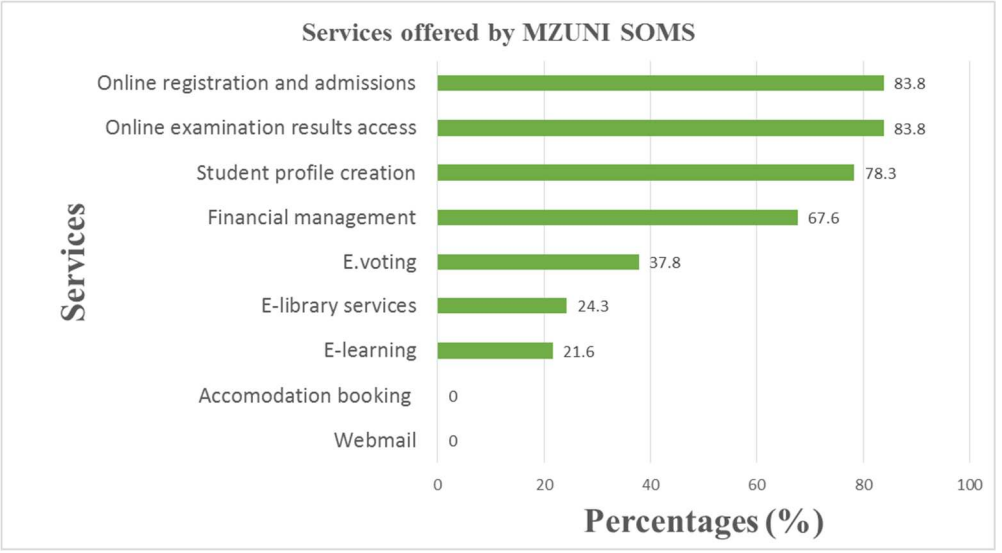
Findings

The researchers distributed thirty seven (37) questionnaires to students in the Faculty of Information Science and Communications, of which every respondent returned the questionnaires, denoting 100% response rate. Of the 37 respondents who took part in the study 26 (70.3%) were males while 11 (29.7%) were females. This shows that there are more male respondents than females. In terms of departmental affiliation, 17 (45.9%) respondents were from the Library and Information Science department whereas 20 (54.1%) respondents came from the department of Information Communication and Technology. Additional information, views and opinions as regards to the use of SOMS were also sought from the Director of ICT services through interviews. The following section presents and discusses the findings of the study:

Services offered by the Online Student Management System at Mzuzu University

Well-designed student information management systems support a lot of functionalities and serves as the gateway to the University's academic operations through the Online Student Portals (OSP) as the component of the system for the students (Secreto, 2015). Figure 1 shows services that students access when using the Mzuzu University Student Online Management System.

Figure 1: Services offered by the MZUNI SOMS (N=37)



From Figure 1 above, two services; online registration and admissions and online examination results were the most selected services by the student respondents with scores of 31 (83.8%) each. The second most selected service was student profile creation with a score of 29 (78.3%). Financial management had 25 (67.6%) selections, e-voting was selected by 17 (37.8%) respondents, e-library services by 9 (24.3%) respondents and e-learning was selected by 8 (21.6%) respondents. No respondent indicated on accommodation booking and webmail services. The results mean that the MZUNI SOMS mostly provides four services namely; online registration and admission, exam results access, financial management and student profile creation. Follow up interviews with the Director of ICT also indicate online registration and admission as a principle services with all these others as add-ons to the system. The results of the study correspond to other prior studies in the field. For instance, many studies highlights that most of these systems support routine transactions like admissions, enrollment, examination management and financial management (Evangelista, 2011; Kaloki, n.d; Maere, 2011; NCS Pearson, 2001; Pacio, 2013 & Secreto, 2015).

Gadgets or devices used to access the student online management system

Respondents were presented with two sets of gadgets or devices that they use in accessing the online student information system. The questions were set to find out which set of gadgets or devices do students use to access the SOMS when they are off-campus/Home and/or On-campus. Results showed that when they are at home or off-campus, students accessed the online student information system through smartphones with a score of 32 (86.4%) while on campus, 34 (92%) respondents use computers in university laboratories. The researchers suggest that when on campus students prefer accessing the online student information system in university computer laboratories because it is free of charge to all students. While the prevalent use of smartphones to access the SOMS at home simply shows it is the device that is most convenient to them, to some extent cheaper than other means like the public Internet Cafes when off-campus.

Other devices or gadgets commonly used by respondents when off-campus includes; personal desktop computers/laptops which registered a score of 17 (45.9%) among the respondents, those who use the Internet cafes to access the SOMS were 4 (10.4%) and only one (2.7%) of the respondents accesses the system via an iPad. Basic phones also showed a lesser percentage in use when accessing the SOMS at home that is it is only used by 3 respondents, representing 8.1%.When on university campus, most students 25 (67.6%) also access the SOMS through their smartphones. Nineteen (51.4%) respondents use their personal computers/laptops in accessing the SOMS, then library computers in the Internet room are only used by 16 (43.2%) respondents. iPads are used by 2 (5.4%) respondents to have access to the SOMS alongside basic phones which also registers the same number and percentages as iPads.

Benefits of the Student Online Management System

The ever-growing use of ICTs and its applications such as the OSIS in academic institutions have come along with numerous benefits to the school management, academic staff as well as students. Generally, in this paper the researchers wanted to know the benefits that the Mzuzu University student online management system offers to the student community. The study revealed that all students (100%) agreed that the main benefit of the Mzuzu University Student Online Management System is that is has cut the time spend during registration in every semester. The results on the benefits of the MZUNI SOMS to students are presented in Table 1 below;

Table 1: Benefits of the student online management system to students *(N=37)*

Benefits of the SOMS to students	***F***	**%**
Less time spent during registration in a new semester	37	100
Timely access to examination results	36	97.2
I can easily check my financial statements (i.e.; fees balances)	33	89
It is easier to add and/or drop new or wrong courses respectively in each semester	30	81
Provide access to various files (i.e. results transcripts, courses, student handbook, university prospectus, MZUNI annual reports, lecturer's handouts)	22	59
24/7 access to the contents of e-library	8	22
Paying registration fees through a secured web access	5	14
Easy communication with lecturers and university management via a webmail feature.	1	2.7
Participation in online discussion forums	1	2.7

Many respondents 36 (97.2%) also agree that the system speeds up access to examination results. While 33 (89.1%) indicated that the system helps them check financial statements. Thirty (81%) respondents indicated that the online registration sub-portal in the system allows them to easily add and/or drop new and wrong courses respectively in each semester. Twenty-two respondents representing 59.4% of the study population indicated that the system provides access to various files (i.e. results transcripts, courses, student handbook, university prospectus, MZUNI annual reports, lecturer's handouts) as a benefit. Eight respondents representing 21.6% were certain that the student online system allows them to have 24/7 access to the contents of the e-library. A follow up interviews with the Director of ICT also confirms that the benefits of the MZUNI SOMS revolves around less time spent during registration to students, timely

access to examination results, easy checking of financial statements and access to various academic files.

Similar to these results are the findings of the study conducted by Pacio (2013) who reckons that through online student's information systems, students may view pertinent school information in their respective programmes of study, have access to their academic and biographic records as well as the ability to update their personal profiles and register for classes. However, these findings seem to be different from other previous studies (EBriks Infortech, n.d, Kasozi, 2006 & Kaloki, n.d). It is said that online student information systems provide access to the contents of e-libraries, students use the OSIS to contribute the contents of e-library and it provides liberty to publish articles and views, and participate in discussion forums or platforms.

Challenges Students face in using the Student Online Management System

In any developing country like Malawi, the use of web-based student information systems could not go without challenges. Typically, the researchers were highly motivated to conduct a study on the assessment of the MZUNI student online management system upon hearing a lot of complaints from the student community that the system posits a lot of challenges to them. From the viewpoint of both students and the director of ICT at Mzuzu University, it is clear that the student online management system catapults a myriad of challenges to the student community. The findings of the current study revealed that 31 (83.8%) respondents experience slow internet connectivity when accessing the student online management system. While 30 (81.1%) respondents said that suffer server loads due user congestions as more students concurrently access the system especially during the times of online registration and online examination results access. All these problems seem to originate from the poor bandwidth of internet connections. It appears the problem of poor bandwidth is persistent in Malawi because Chawinga and Zozie (2016) and Chawinga and Zozie (2016b) have previously reported about a similar problem. On this, Okoye (2015) also says that this challenge is a result of smaller bandwidth of campus internet network compared to the overwhelming number of users. He emphasizes that even if the network may be good, it becomes poor when used by many users at a time and he attributed this overloading of servers due to user congestions to Internet Service Providers (ISP) and slow speed processing capacity of servers.

In addition, the study shows that high cost of Internet data bundles was a challenge cited by 24 (64.8%) respondents. In Malawi, the cost of internet data bundles and charges are very high and this affects students in accessing the SOMS using the mobile phones. Precisely, the World Bank accounts that the retail price of an entry level mobile broadband package (500 MB per month of data) is equivalent to 24.4% of Gross National Income (GNI) per capita, while a fixed connection exceeds 111%, 46 compared with the United Nations (UN) broadband

Commission affordability target of 5% or lower. In a recent national survey, affordability was cited by 55% of citizens as the main barrier to internet access. Other challenges include eminent in the study includes: forgetting usernames indicated by 24 (64.8%) respondents; high costs of password recovery indicated by 21(56.7%) respondents; lack of system regular updates was indicated by 20 (54.1%) respondents; lack of basic computer literacy skills 15 (40.5%); browser incompatibility 13 (35.1%); frequent power outages/blackouts 10 (27%) and the system is complex to use was a challenge to 9 (24.3%) respondents.

Suggestion on dealing with the challenges

Students were given a chance to suggest solutions to the challenges that they face when using the web based student information system. The question in this section was open ended, which sought students' opinions and suggestions on what the university do to improve the efficiency of the system and a thematic analysis of the results is presented in Table 3 below:

Table 2: Solutions to the challenges (N=37)

Challenge (s)	**Suggested Solution (s)**
Lack of personal information privacy and confidentiality in the system	Twenty-four (64.8%) said that the exams results graph in the system is not confidential, it infringes on their personal privacy. Therefore, it was suggested that the exams performance graph should be completely removed or should only appear inside the main view of the results not on every page or else it should be positioned at a more secure and private place, not live on every page as it is now. This is seen in the opinions that students were giving; "*they should improve on the results access, like when viewing the performance graph, it must be at least confidential"*QR10-LIS Another respondent wrote "*the graph of the results on the system does not show any privacy at all, hence in my opinion it should be removed on the front page and be put somewhere else than there"* QR37-ICT *"results graph should not appear on the wall, it should be a bit private, 'cause we use ICT labs, and people there are congested"*QR4-LIS
The system is not updated regularly	Seventeen respondents, 29.7 % of the study population were of the opinion that the system should be updated regularly to incorporate new features and that some features of the system that do not work, should start working. One respondent opinionated that *the system should be updated regularly so that some features that*

	don't work e.g.; continuous assessment results must start working. Also a webmail feature should be incorporated in the system. It would also be very important if e-learning, e-library services, online voting, accommodation booking features are also embedded in the system" QR18-ICT
Slowness of the internet connectivity	Thirteen (35.1%) respondents proposed the establishment of a speedy WI-FI or internet connection on campus with a larger bandwidth to address issues surrounding the erratic network connections in the campus
High cost of passwords recovery	Five (13.5%) research participants were against the issue of paying money to have their passwords reset once forgotten. They asked the university to consider endorsing a free and automatic reset of passwords amongst the student community.
Limited number of university computers and ICT laboratories	Three (8.1%) respondents suggested that the university should procure more computers and extend the computer laboratories to other rooms to accommodate large number of users of the system especially during the time of registration and examination results access.
Few ICT personnel in the ICT Directorate	One respondent expressed the need for the university to employ more ICT personnel to help in addressing the concerns of students pertaining to the use of the system and in addressing system errors. One respondent said; "*it should employ more ICT personnel to reduce workload. Students wait for a long time to have their issues resolved since there is only one ICT staff serving the whole community (when dealing with system errors)* QR12-LIS
Long queues in the finance department to have student online accounts activated	Two research participants (5.4%) raised concerns over standing on a long queue in the finance department to have their fees balances cleared, and have their students' online accounts activated before proceeding to the registration process. Instead, they suggested that once a student has paid fees in a bank and has no balance, the student online account should be automatically activated via a direct link that can connect these accounts via an integrated database. One of these research participants wrote "*since we are using online payment of school fees, we don't need to stand a long queue waiting for the bank receipt to be activated by the admin after the bank services, it should be a direct link*" QR33-ICT

Frequent power outages	Finally, one respondent had a view that to solve the problem of intermittent electrical power, the university should consider procuring reliable generators, that will enable electrical power present around the clock which will also imply the 24/7 access to the system among students. The respondent wrote: *"the university should procure Gen-sets/generators as there is frequent power outages blackouts"* QR14-LIS

Conclusion

In technology driven world, web based student information systems play a very important role in meeting the requirements of sound and effective management of students' information and/or records in academic institutions. Today, the presence of online student information systems is not only a symbol of modernity in universities but an evolution that has simplified the process of managing student data and records. While at the same time, these systems facilitate the seamless transfer of information between students and the university management with the aid of internet technologies. This paper has brought into limelight that Mzuzu University student online management system has eased the registration process and it also speeds up the access to online examination results amongst the student community. Conflicting views from students also indicates that even though the online student information system was adopted and implemented, it is still in its mid way of growth due some challenges that reflects on the poor state of ICT infrastructural development at the institution. Therefore, investing in ICTs to improve on poor network bandwidths and having fully fledged modern information and communication facilities can help to ensure full utilization of the system by students. Meanwhile, there is sign of improvements in business operations at the institution since the inception of the student online management system, as such this paper calls for adding new services in the system to make it all encompassing and to meet the diverse needs of the student community.

Recommendations

The various issues that emanated during the survey have prompted the researchers to put forward the following recommendations which could further make the student online management system more effective and efficient to its students:

- The ICT Directorate with financial assistance from the university should upgrade their servers and increase the Random Access Memory (RAM) of the system to deal with the problem of server loads due to user congestions. At the same time, it is important that registration process

should not have deadlines, instead it should be done in phases or else students should start registering when they are at home.

- Introduction of new services in the Student Online portal. New services such as e-learning, e-library services, webmail, online discussion forums, online voting and accommodation booking should be incorporated into the system to meet the needs of students.
- Since most students access the system using computers in university laboratories and library internet room, it is recommended that the university to procure more computers and extend laboratories to other rooms to accommodate the ever increasing number of students at the campus.
- Finally, accessing the SOMS in open space computer laboratories has raised privacy concerns among the students, many students said that most of the times the labs are 49 congested and their friends can easily see the examination results graph that is lively displayed upon logging in into the system. The study therefore, recommends that there should carrel for each computer in the university ICT laboratories.

References

Asogwa, D. U., Muhammed, A., Ahmed, B. & Danmaitaba, S. G. (2015) *Need for Students Information Management System (SIMS) for Nigerian Universities in a technological age: Challenges and strategies for proper integration*; Vol.2, Issue 12 p.1765-17

Bharamagoudar, S.R., Geeta, R.B. & Totad, S.G. (2013) Web Based Student Information Management System. *International Journal of Advanced Research in Computer and Communication Engineering* Vol. 2, Issue 6.

Braun, V. and Clarke, V. (2006). *Using thematic analysis in psychology. Qualitative Research in Psychology*, 3: 77-101.

Chawinga, W.D. and Zozie, P.A. (2016). Information needs and barriers to information sources by open and distance learners: a case of Mzuzu University, Malawi. *South African Journal of Information Management*, 18(1). http://dx.doi.org/10.4102/sajim.v18i1.692.

EBriks Infotech (n.d) *Student Management System*. Retrieved on 4th march, 2017 from www.ebricks.com

Evangelista (2008). *Student Information System (SIS) of Nueva Viscaya State University* Philippines: St. Paul University Philippines, pp. 20-24, 2011

Igweonu, C. C. (2013). *Extent of Utilization of Information and Communication Technology for Effective Management of Polytechnics in the South Eastern state, Nigeria.* South Eastern: Polytechnics

Kaloki, T. (n.d) *School Management System (savvy school*). Pal soft: Pal soft Education Services

Kasozi, A. B. K. (2005). *University Education: Challenges and Opportunities for Reform*. Kampala: Fountain Publishers

Maere, C. (2011) *Expanding E-Learning Initiatives in Malawi.* Accessed on 5th, March, 2016 from www.ubuntunet.net/../maere_uc2011.pdf

Marrero, S. (2009). *Student Information System for the University of the Cordilleras*. A masteral project study. University of the Cordilleras.

Mzuzu University (2015) *Mzuzu University annual Report 204/15*. Mzuzu: Mzuzu University

Mzuzu University (2017) *Mzuzu University Student Online user manual*. Accessed on 16th February, 2017 from www.mzuni.ac.mw

Mzuzu University (2017) *Mzuzu University 18th Congregation Special Report, March 2017*. Accessed on 16th May, 2017 from www.mzuni.ac.mw

NCS Pearson (2001) OSIRIS-Students Information Management System. Retrieved from http://k12.ncspearson.com/k12/school/osiris.html [29th May, 2017]

Pacio, R.D. (2013) Online Student Information System of Benguet State University (OSIS-BSU), Philippines. *International Journal of Innovative Interdisciplinary Research* Issue 4.

Pan, J. (2004) *Requirements Analysis for a Student Information System*. Leeds: University of Leeds

Paton, M., Q. (2002) *Qualitative Research and Evaluation Methods.* London: Sage Books

Paulsen, M. F. (2002) *Online Education Systems: Discussion and Definition of Terms.* Accessed on 28th October, 2016 from http://home.nettskolen.com/~morten

Maere, C. (2011) *Expanding E-Learning Initiatives in Malawi.* Accessed on 5th, March, 2017 from www.ubuntunet.net/../maere_uc2011.pdf

Secreto, P.V. (2015) Learners' satisfaction level with Online Student Portal as a support system in an Open and Distance e-Learning Environment (ODeL). *Turkish Online Journal of Distance Education*-TOJDE July 2015 ISSN 1302-6488 Volume: 16 Number: 3 Article 3

Swartz, N. (2007). *Data Management Problems Widespread: Organizations Should Regard Data as their Greatest Asset and Invest in Data Management Accordingly*. (ON THE EDGE: The Use & Misuse of Information). Retrieved June 2, 2017 from www.accessmylibrary.com

The World Bank (2016) Digital Malawi Project: Project Information Document/ Integrated Safeguards Data Sheet (PID/ISDS). Accessed on 7th July, 2017 at http://www.worldbank.org/infoshop

University of Malawi (2017). *College of Medicine Student Information System* Accessed on 16th February, 2017 at www.medcol.mw