

AN INVESTIGATION INTO THE STATE AND USE OF ICTS BY ACADEMIC STAFF A CASE OF THE COPPERBELT

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Learning Institutions all over the world are using ICTs in their administrative, teaching and learning activities. Despite many interventions by management and governments to support the use of ICTs in the teaching and learning activities in higher learning institutions, studies have shown that the adoption and use of ICTs by academics to deliver their teaching still remains low. However, the magnitude of the problem, especially in institutions of higher learning like CBU, is relatively unknown owing to the limited or lack of research undertakings in the field. The aim of the research was to establish the current state of ICTs and determine the levels of adoption and use of ICTs by academics at the Copperbelt University in Zambia. The research showed that the adoption of ICT tools by Academic staff in their teaching and learning activities at the Copperbelt University is low. Obstacles responsible for the low levels of adoption were identified. The paper then made recommendations that would enable academic staff to use ICTs to enhance the learning experience by students and later produce quality and relevant graduates to the current needs of society.

Keyword: Academics, Copperbelt University (CBU), Information and Communication Technologies (ICTs), Research, Teaching and Learning.

RESEARCH BACKGROUND

The Copperbelt University situated in the northern Zambian town of Kitwe was established as an autonomous university (it began as a satellite campus of the University of Zambia) in 1987 with two schools and with an initial enrolment of about 500 students. The University has since enjoyed significant growth as it now boasts of a total of eight schools and three directorates with a total student population of slightly below 10, 000 by 2014 Chanda (2015). ICTs have given rise to new modes of organizing the educational environment in universities. The Copperbelt University administration sees ICTs as necessary tools in the process of learning and teaching. The administration in its quest to promote the use of ICTs in its daily activities including the teaching and learning set up a department known as the Directorate of ICT (DICT) to oversee the ICT infrastructure of the University. The vision of the directorate is to be identified as a leader in the deployment and innovative use of ICT/s to support teaching, learning and research outreach, and other professional activities and initiatives at the Copperbelt University and to achieve this vision the directorate has the following objectives (CBU, 2016):

1. Easy access to the network for members and authorized visitors;
2. A single method for accessing online resources, from any location and at any time. Systems to support teaching, research and administration which talk to one another, are continuously available, and can be tailored for, and evolve with individual requirements.
3. Provision of quick access to digital publications and journals.
4. A system for monitoring undergraduate and graduate academic progress throughout their time at the University.
5. Secure online storage for personal files and a digital repository for the outputs from research, teaching and administration. Provision of training and support associated with each ICT service or development.

The Copperbelt University through the directorate has introduced a variety of ICT tools such as LCD projectors, interactive screens as well as software like power point that can be used to enhance teaching and learning experience in a classroom. The University has even made additional efforts to provide additional facilities like computers, computer laboratories, broadband wired and wireless internet connection (Eduroam) and local area network to assist academics in their teaching and research activities. It is expected that, academics would be very excited to receive these facilities and

adopt them in carrying out their teaching and research activities. Research has shown that effective use of ICT with multimedia and graphics for example, enriches teaching and enhance interactivity in learning (Bee T L & Chia H S, 2008). With this large support and investment in the ICT infrastructure, and with increased research evidence on the positive impact of the use of ICT in the teaching and learning experience, academicians at the Copperbelt University are expected to be competent and effective in utilizing these ICT tools. The question that the research sought to answer was: are all academics at CBU ready and making full use of these available ICT in their teaching?

LITERATURE REVIEW

Integration of ICT is defined as a process of using any ICT (including information resources on the web, multimedia programs in CD-ROMs, learning objects, or other tools) to enhance student learning. Researchers have argued that the current information revolution and increasing impact of information and communication technologies has modernized the processes of learning and research in most universities (Kumar , 2005) p.1-22), (Chinwe & Nwezeh, 2010), (Ron, 2003).

Academic institutions like CBU have and are allocating considerable amount of resources and time into ICTs in the conviction that adding up ICT tools and related technologies to a class improves the education experience for students. Conversely, little is known about Lecturers' perceptions to use these new technologies. Understanding factors related to Lecturers perceptions and behavioural intentions towards ICT might support the decisions and distribution of funds for computer mediated communications technologies that comprise the most positive financial return (Hitt & Shimizu, 2004, p.44-59). Researchers have argued that the rate of adoption of ICT by academics in their teaching and experience is influenced by a number of factors ranging from attitude to competence (Philip, Odusola & Dibu, 2007, p. 172-175). Models have been proposed explaining the factors responsible for the adoption and use of ICTs by consumers.

The technology acceptance model (TAM) and the extended technology acceptance model (TAM2) have been widely used in studies examining why consumers used or adopted new communication technologies (Lang, 2007, pp 33-49), (Wu, 2004, p. 719-729). TAM examines the mediating role of perceived ease of use and perceived usefulness in their relation between systems characteristics (external variables) and the probability of system use (an indicator of system success). A key purpose of TAM is to provide a basis for tracing the impact of external variables on internal beliefs, attitudes, and intentions. It suggests that perceived ease of use (PEOU), and perceived usefulness (PU) are the two most important factors in explaining system use. (Legris & Ingham, 2003, pp 191-204). TAM is as shown in figure 1 below.

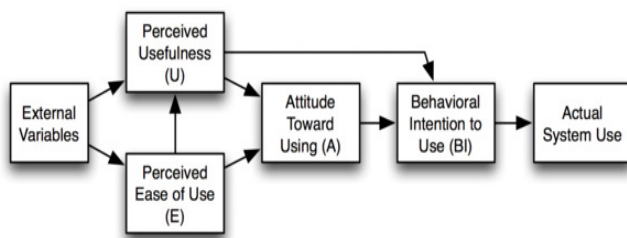


Figure 1. Technology Acceptance Model (TAM)

TAM 2 extended the original TAM model to explain perceived usefulness and usage intentions in terms of social influence and cognitive instrumental processes. TAM2 differs from the original TAM model by adding three additional variables: "subjective norm", "voluntariness", and "image" (Davis & Venkatesh, 2000 p. 186-204).

SIMILAR STUDIES

Similar studies that assessed the rate of adoption of ICT in the learning and teaching have been conducted in Universities worldwide and in Africa. To the best of our knowledge no study had been done in Zambian Universities at the time of this study. This literature study reviews a few of these studies by looking at the similarities and identifies gaps that this study fills in. A study was done to review obstacles which inhibit adoption of ICT in higher educational institutions by looking at a number of studies done by other scholars on the subject (Samuel & Hillar, 2014, p.462-470). The review identified lack of institutional support, financial support, time to learn new technologies, access to computing, technical support and training. Other obstacles identified were technology reliability, uncertainty about its worth, resistance to change, negative attitude, awareness, relevance, ease of use, attitude of organization, and computer literacy.

A study was also conducted that assessed the state, adoption and use of ICTs by students and academic staff at Mzuzu University in Malawi (Chaputula, 2012, p.364-382). The study showed that the state of ICTs at Mzuzu University was poor but the adoption and use of ICTs was high. The attributed obstacles to the adoption and use of ICTs by the academics and researchers included poor network infrastructure, the limited number of computers, and the high cost of

internet access, persistent power outages, and the lack of relevant ICT skills, among others. This study attributed the adoption level to limited ICT infrastructure.

Another study was done that looked at the academics' experiences of using ICTs for teaching and learning in the United Kingdom (Eynon, 2005, p. 168-180). The study revealed that motivation played a major role in adoption of ICT by academics. The Academics' motivations for using ICTs included: enhancing the educational experience for their students; to compensate for some of the changes occurring in higher education, such as the rise in student numbers and demand for flexible learning opportunities; and personal interest and enjoyment. The study also outlined the difficulties academics encountered when using these technologies for teaching and included: a lack of time; dissatisfaction with the software available; and copyright.

A study that focused on the awareness, adoption and acceptance of ICT innovation in higher education institutions was conducted at the University of Jos, in Nigeria (Oye, Aihad & Abraham, 2011, p. 1393-1409). The study revealed that although the use of ICT is mandatory, however the level of adoption among the university academic staff is still low. The researchers outlined the challenges to ICT usage among academic staff and they ranged from, lack of funds, no opportunity for training, lack of sponsorship by the school management, inability to acquire personal ICT facilities, no ICT facilities at workplace, poor electricity supply, lack of ICT knowledge, insufficient time due to workload, lack of interest in learning, and lack of time for practice.

A survey of ICT adoption by teaching staff, senior administrators and postgraduate student in Makerere University was done (Bakkabulindi, Nkata & Amin, 2005). The Survey sought to investigate links between ICT adoption and perceived ICT characteristics (its perceived relative advantage, compatibility, user friendliness and observability). Results of the survey indicated low levels of ICT adoption, and identified the following as the perceived ICT characteristics significantly affecting ICT adoption; perceived relative advantage and observability of ICT. A study to explore the dynamics of ICT adoption was done in 10 universities in Kenya and Nigeria (Oyeyinka & Adeya, 2004, p.841-845). The results suggested mixed demographic significance in the adoption of ICT. The researchers concluded that age is positively correlated with use while there is no significant gender disparity in ICT use. The research revealed that individual income and institutional provision of end-user facilities influence adoption and use. The researchers also made a conclusion that ICT use and in particular the Internet for research and teaching is still limited to the most basic functions.

A study that looked at the Factors Affecting ICT Adoption in Tertiary Institutions in Ghana: A Case of Kwame Nkrumah University of Science and Technology (Yeboah, Kwame & Kyere-Djan, 2013). The study showed that perceive usefulness and ease of use is a primary factor driving ICT adoption. The study also revealed that ICT is not fully integrated in teaching, research and learning at KNUST. A major obstacle is that though most users are aware of the potential benefits they are not ready or unwilling to fully embrace ICT. Several factors were also identified including inadequate infrastructure and skills to use ICT.

RESEARCH METHODOLOGY

The research used a survey method whose study population included academics. Data for the study was collected using an interview guide and standardized questionnaires which comprised both closed and open-ended questions. The data collected was analyzed using SPSS software. The sampling area only included the Copperbelt University. Systematic and Random sampling was used to determine the study groups. A sample size of 120 academic staff was adopted. In terms of questionnaires, the study achieved a 97 per cent response rate for academic staff while the Library Head of ICT Section was also interviewed. Data collection was done in October 2015.

RESULTS AND DISCUSSIONS

The dependent variable in this study was ICT adoption and use among Academics at The Copperbelt University. Thus a section of the questionnaire was devoted to this dependent variable, with 14 items or questions on knowledge and adoption of available ICT tools. The respondent was expected to do a self-rating in terms of knowledge and/ or use of ICT facilities using a scale ranging from one, for strongly disagree to five, for strongly agree.

Demographic Information

Of the one hundred and thirty (130) copies of the questionnaires administered, ninety two (92) were returned and used for analysis giving 71% return rate. The biggest percentage of the participants in terms of gender was male, representing a seventy-nine percentage of the total number of respondents. Respondents came from six (6) Schools and the highest percentage of responses was from the School of Business (SB) with twenty two (22), (23.9%) of the total responses, followed by the School of Built Environment (SBE) and School of mathematics and Natural Sciences (SMNS) with (16) (17.4%) each. The School of Mines and Mineral Sciences (SMMS) with (15) (16.3%) followed. The fourth highest responses were from the School of Engineering (14) (15.2%). The lowest percentage of responses was

from the School of Natural Resources (SNR) with eight (8) (8.7%). On the academic designation of the respondents, most of the respondents were junior faculty members (77) (83.7%), followed by Senior Lecturers with (11) (12%). The lowest percentages were Associate professors and Professors, with (1) (1.1%) each. Two (2) (2.2%) respondents opted not to indicate their rank. On the age of the respondents, (13) (14.1%) of the faculty members were below 30 years and more than half of the participants (54) (58.7%) were in the age range between 30 and 45 year-old. 11 (12%) of the respondents faculty were between 46 and 55 years and (14) (15.2) were 56 years old and above. On the education level of the participants, most had a master's degree (68) representing 74% of the total respondents, (20) (21.7%) had PhDs and only (4) (4.3 %) had undergraduate degrees. In terms of teaching experience, (33) (35.9) had five years or less in teaching at the University level, (34) (37%) had teaching experience at a university of between 5 years and 10 years. Those that had taught for between 11 and 20 years were (19) (20.7%) and only (6) (6.5%) had taught for more than 21 years. The respondents were also asked to indicate the field of specialty, the biggest number (36) (39.1%) of the respondents were specialised in Engineering courses, (23) (25%) were specialised in business courses, (18) (19.6%) were specialised in natural sciences, (3) (3.3%) in ICT related courses and (11) (12%) did not specify their specialty.

Computer literacy of respondents

Respondents were asked to rate their level of agreement with a statement that they had relevant ICT skills. Research findings had shown that that most of the academic staff 87 (94 per cent) possessed relevant ICT skill as they agreed or strongly agreed, while only 1(1 per cent) did not possess relevant ICT skills. 4 (4%) were neutral. These findings are presented in table I below. The findings showed that almost all the lecturers had some knowledge of computer and therefore had the capability to use ICTs in their teaching.

TABLE 1 :POSSESSING OF RELEVANT ICT SKILLS

Rating	Frequency	percent
Strongly Disagree	0	0.0
Disagree	1	1.1
Neutral	4	4.3
Agree	39	42.4
Strongly Agree	48	52.2
Total	92	100.0

The Availability, current state and accessibility of ICTs at The CBU

The question of the state of ICTs at the institution was addressed by examining aspects of the Internet Connectivity, available and state of computer facilities, accessibility to printers, scanners and photocopiers, availability of ICT teaching facilities such as projectors and laptops and availability of relevant software.

Adoption and use of ICTs is largely dependent on the availability, adequacy and state of computer facilities [14]. The research, therefore, looked at the availability and state of these facilities. The head ICT indicated that the Copperbelt University had provided computers to the majority of the academic staff. This was supported by the responses from the questionnaires were 89% of the respondents confirmed that they had computers in their offices.

The respondents were then asked to rate their level of agreement with the statement that the available computers in their offices were in a good state with appropriate responses. The results showed that 46 out of the 82 valid responses either agreed or strongly agreed with the statement that the computers in their offices were in a good state, representing 50% of the total responses and only 13% either disagreed or strongly disagreed, confirming the statement that most of the computers were in a good state. The remaining 27% were neutral. 10% of the respondents had no computers in their offices and therefore did not give any response. Table II below shows the percentage distribution of respondents on the state of the computers in their offices. It can be deduced from the findings that a good number of computers in lectures' offices needed replacement.

TABLE 2:STATE OF THE COMPUTERS IN FACULTY OFFICES

Rating	Distribution of respondents on state of computers	
	Frequency	Percent
strongly Disagree	1	1.1
Disagree	11	12.0
Neutral	25	27.2
Agree	35	38.0
Strongly Agree	11	12.0
Total	83	90.2
System	9	9.8
Total	92	100.0

The University has purchased other ICT related equipment such as printers, photocopiers and scanners for use by academic staff. The researchers probed the status of such equipment. Findings in this regard showed that most departments had at least one printer, it was however, indicated that most printers had malfunctioned and it took long for spares to be provided by the purchasing department of the University, a development which limited their use. The study revealed that academic staff did not have ready access to these printers. Respondents were asked to rate their level of agreement with a statement that they had ready access to printing, scanning and photocopying facilities with appropriate responses. The results showed that 44 out of the total responses either agreed or strongly agreed with the statement that they had ready access to printing, scanning and photocopying facilities, representing 47.8% of the total responses and 33.7% either disagreed or strongly disagreed. The remaining 18.5% were neutral. Table III below shows the percentage distribution of respondents on the accessibility of scanning, printing and photocopying services at the University. It can be concluded from the findings that these facilities are not adequate in the university.

TABLE3:READY ACCESS TO PRINT, SCAN AND PHOTO SERVICES

Rating	Distribution of respondents on access to ICT facilities	
	Frequency	Percent
Strongly Disagree	15	16.3
Disagree	16	17.4
Neutral	17	18.5
Agree	40	43.5
Strongly agree	4	4.3
Total	92	100.0

The research used responses from academic staff to determine reliability of the campus network. 66% of the respondents either disagreed or strongly disagreed to the statement that Internet Connectivity at CBU was reliable. Table IV below gives a breakdown of responses on the reliability of the internet. We can therefore conclude that Internet connectivity is not reliable at CBU.

TABLE 4:INTERNET CONNECTIVITY IS RELIABLE

Rating	Distribution of respondents Internet reliability	
	Frequency	Percent
Strongly Disagree	32	34.8
Disagree	29	31.5
Neutral	19	20.7
Agree	10	10.9
Strongly Agree	1	1.1
Total	91	98.9
Missing System	1	1.1
Total	92	100.0

Levels of ICTs adoption and use at CBU and Obstacles to ICT adoption

In an effort to find out the level of adoption and use of ICTs academic staff at the Copperbelt University, the researchers probed issues bordering on actual use of available ICTs and ICT skills. According to (Tang & Austin, 2009), faculty

members in Universities use a number of teaching technologies which include the Projector, PowerPoint, Video, the Internet to deliver their teaching. These technologies can be integrated to deliver a single lecture. For instance, faculty members can show video through PowerPoint and the Internet, and can show other professors' PowerPoint slides through the Internet. The research sought to find out the adoption of these technologies by faculty members in their teaching and learning experience.

Use of LCD projectors:

The respondents were asked to state if they used these projectors in their teaching and results showed that (59) (64%) had adopted the use of projectors. The respondents that indicated using LCD projectors were then asked to state if the projectors they were using were personal or University projectors. 50% of the respondents indicated that they were using their own projectors and the remaining 50% were using the University projectors.

The respondents that were using University projectors were asked to state their agreement on the readily availability of these projectors. Out of the 36 that were using University projectors, only 10 either agreed or strongly agreed. The rest were neutral, disagreed or strongly disagreed. Table V below gives a breakdown of responses on the availability of University projectors. It can be concluded from the findings that wanted to use projectors in the teaching but they were hindered by the unavailability of these tools.

TABLE 5:THE PROJECTORS ARE READILY AVAILABLE

Rating	Frequency	Percent
Strongly Disagree	2	2.2
Disagree	10	10.9
Neutral	14	15.2
Agree	9	9.8
strongly Agree	1	1.1
Total	36	39.1
Missing	56	60.9
Total	92	100.0

Use of specialised software

The respondents were also asked to state if they used specialised software in their teaching and results showed that (57) (62%) used specialised software in their teaching. The respondents that indicated using specialised software were then asked to state if the software they were using was personal or University software. Only 6 of the respondents indicated that they were using the university acquired software and the remaining 52 were using their own sourced software. The respondents that were using University software were asked to state their agreement on the readily availability of these software. Out of the 6 that were using University software, only 2 either agreed or strongly agreed. The rest were neutral, disagreed or strongly disagreed. The study brought out the fact that lecturers at CBU require the use of specialised software in their teaching but these pieces of software are not available in the university.

Lack of administrative support

Administrative support plays an important part in any university in the adoption of ITC in teaching and learning. Responses in the table below shows a general lack of support by the management in the use of ITC in teaching and learning. The majority of the respondents (19) agreed that there is no administrative support. Only seven agreed and 6 were neutral. 60 decided not to respond to the question. Table IX below summarizes the responses. It can be concluded from the findings that administration was not doing enough in facilitating the usage of ICTs by lecturers in their teaching.

TABLE 6:MINIMUM ADMIN SUPPORT FOR THE ADOPTION ICTs

Rating	Frequency	Percent
Strongly Disagree	3	3.3
Disagree	4	4.3
Neutral	6	6.5
Agree	14	15.2
Strongly Agree	5	5.4
Total	32	34.8
Missing	60	65.2
Total	92	100.0

Minimum technical support

Support given by technicians to lecturers when teaching equipment is malfunctioning is minimal and this discourages some lecturers from using ITC for teaching and learning. The majority of the respondents (22) agreed that support by the technical staff was minimal and only five disagreed and 4 were neutral. Table XI summarizes the responses. It can be deduced from the findings that technicians were not providing the needed technical support to enable lecturers use ICTs in their teaching activities.

TABLE 7: MINIMUM TECHNICAL SUPPORT

Rating	Frequency	Percent
Disagree	5	5.4
Neutral	4	4.3
Agree	17	18.5
Strongly Agree	5	5.4
Total	31	33.7
Missing	61	66.3
Total	92	100.0

CONCLUSION

The Copperbelt University is encouraging the use of Information Communication Technology (ICTs) in the teaching and learning as well as research. Despite many interventions by management and governments to support the use of ICTs in the teaching and learning activities in higher learning institutions, studies and this research have shown that the adoption and use of ICTs by academics to deliver their teaching still remains low (Enakie & Onyenania, 2007, p. 20-28). This study analyzed the state, levels of adoption and use of ITCs by academic staff at The Copperbelt University (CBU). Specifically, the study analyzed the current state of ICTs at CBU, levels of usage in teaching and learning, research, difficulties encountered when using ITCs and factors that influence further adoption of new technology.

On the state, adoption and use of ITCs, the results of the study showed that CBU administration has provided desk top computers to the majority of academic staff and this is supported by 89% of the respondents who confirmed that they had computers in their offices. On the state of the computers available in their (academic staff) offices, the results showed that 46 out of 82 valid responses either agreed or strongly agreed that the computers in their offices were in good state and this represents 50% of the respondents. 13% of the respondents disagreed or strongly disagreed.

On the status of other ICTs equipment such as scanners, printers, photocopiers and others, the results of the study showed that most of the departments had at least one printer for use by academic staff and that most printers were not functional and took long for spares to be provided by the purchasing department of the university.

On campus network reliability and Internet connection, the study results showed that CBU network was not reliable and the bandwidth is small and needs upgrading. This was confirmed by responses from the academic staff where 66% of the respondents either disagreed or strongly disagreed with the statement that Internet connectivity was reliable at CBU (see table IV).

On levels of ICTs adoption and usage the results of the study showed that there has been an improvement in the use of ICT in teaching and learning. 64% of the respondents had adopted the use of ICTs based equipment such as projectors in their teaching and learning. However 50% of the respondents used their own projectors whilst the remaining 50% used university projectors.

On obstacles to the adoption of ICTs in teaching and learning, the study results showed that the state of ICT was the major obstacle. One of the reasons as to why ICT has not been widely adopted in teaching and learning despite the high levels of ICT literacy among academic staff includes lack of administrative support. Although CBU administration advocates for the use of ICTs in teaching and learning, it is not given the priority it deserves. This is evidenced by the results of the study which showed that 50% of academic staff use their own projectors and there is lack of hardware and specialized software for teaching and learning some courses.

RECOMMENDATIONS

Based on the findings and the conclusions drawn in this study, the paper makes the following recommendations for the adoption and use of ICT at the Copperbelt University and other learning institutions at acceptable levels.

- The government of Zambia through the line ministries should allocate sufficient funds to support the purchasing and maintenance of ICT based systems by the university.

- The university through the Directorate of ICT should introduce a variety of training programs for unskilled academicians. The training programs should include basic things such as teaching using projectors and interactive screens, preparing PowerPoint slides, record management using spreadsheets and other applications etc.
- The University through the Directorate of ICT should organize seminars, workshops, etc. to create awareness among academicians about the current development and technologies in teaching field.
- Academicians should be made aware of ICT facilities provided by the university.
- There should be adequate technical support for academicians in the classrooms, when academicians receive the support that they need it will encourage the use of ICT as ease of use encourages the use of ICT.
- University management should purchase more computers, printers and photocopiers for use by academic staff.
- University through the directorate for ICT should facilitate installation of a proxy server to ensure that academics that use private networks to access internet are able to access electronic journals and other e-resources the university is prescribed to.
- Power back-up systems covering the entire institution should be installed to ensure continued use of ICT appliances it times of power outages.

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