The Magnitude of ICT Adoption in Institutions of Higher Learning in Zimbabwe: A Case for Bindura University of Science Education

Gate Tsitsi

Bindura University of Science Education, Faculty of Science Education, P Bag 1020, Bindura, Zimbabwe. Email: tgate2009@gmail.com, tgate@buse.ac.zw

Abstract

The paper explores the magnitude of ICT adoption and acceptance in institution of higher learning. While ICT has since taken centre stage in almost all activities in the global village, institutions of higher learning need to stick out as users of ICT information in justifying their existence. Students from these institutions should display high levels of mastery of ICT skills so as to be the pole bearers of technology to the people. All workers in the institutions of higher learning need therefore to be well equipped with appropriate ICTs for continuous support of students learning in order to churn out quality graduates who are able to utilise all key 21st century ICT skills. More often than not, challenges of internet connectivity, inadequate infrastructure and resources have derailed institutions of higher learning to achieve the defined levels of excellence or produce confident graduates in the area of ICT. Institutions of higher learning therefore need transformative policies if they are to benefit from ICT. It is therefore recommended that they could partner with people in the diaspora to assist in developing ICT infrastructure, research, technology transfers, information exchange and training.

Keywords: ICT, ICT Education, Magnitude, institution of higher learning

Introduction

The paper explores the state of affairs on ICT adoption at Bindura University of Science Education in Zimbabwe. While ICT has taken centre stage in almost all activities in the global village, institutions of higher learning have not been spared in embracing the new innovations. However, the pace of adoption and acceptance in the use of ICTs varies from one institution to the other. Bindura University of Science Education's role of disseminating knowledge and skills to students and community the university to emerge as major user of ICTs both in production, utilization and extension outside the institutional borders.

The use of ICTs should be seen growing through production of well-versed and skilled personnel. Well informed and skilled personnel in ICTs help any institution in justifying its existence through activities from the students after graduation. Despite these activities, Institutions of higher learning have to ensure that they are leaders in establishing the required ICT infrastructure ranging from the most basic to the most complex ICT gadgets. Institutions of higher learning regardless of country are operating in the global village which has made the world smaller due to the easy interactions that have been brought by ICTs. Zimbabwe has joined other nations in the ICT revolution to empower people from different sectors of the economy with ICT skills for national development. The paper therefore, seeks to establish the level of ICT adoption at Bindura University of Science Education and how staff and students are skillful and knowledgeable of ICT resources that support the educational process for the benefit of the general public.

Definition of terms

In this paper, the following terms are frequently referred to and are defined as follows:

ICT – information communication technology,

ICT Education- teaching and learning of ICT

Magnitude – level/ extent

Institution of higher learning – Universities, colleges, polytechnics and technical colleges

ICT Education

Institutions of higher learning are critical agents of change as they offer wide range of programmes. Academics and Academic - support staff proffer a whole lot of knowledge and skills to students to which ICTs is part of that. ICT education brings technological development and has become a vehicle for

development. It is also part of the package which students utilises while on campus as well as when out in the world and at work stations. It is however important to note that Lockesh (2013) has expressed that technology is just simply a tool to aid education and learning. Hence, the need to utilise skilled and trained personnel in ICTs to disseminate appropriate IT skills.

Generally, ICT is currently being accessed by almost everyone, thereby reducing the notion of the past that it was for the wealthy and selected few as one can find the different modes of ICT e.g. a cell phone being right down in remote areas.

Ekeke and Mbachu (2015), in their recent study of some universities and ICT usage, found out that students are visibly not being carried along in the taking up of ICTs due to non availability of ICT facilities in the universities. Hence they recommended the need to scale up ICT facilities, exposure of students to different ICT gadgets and to different implementation frameworks. This goes to show that technology may not be fully utilized if are not exposed to it. It is therefore of paramount importance to ensure that the full potential of ICTs is unlocked by establishing effective methods to deal with the ICT challenges in education.

According to Oliver (2011) the world is moving rapidly into digital media and information thus, the role of ICT in education has become more important. He indicated that the prominence of ICT will continue to grow and develop in the 21st century to transform teaching and learning. The 21st century calls everyone to be knowledgeable of the 21st century skills to be able to survive in the information age. Development of ICTs thereby takes various levels of development from the initial planning to implementation. Under planning, an institution has to ensure that both human and financial ICT resources are available as well as policies and procedures for implementation and maintenance of a robust ICT framework. Implementation of the ICT plan follows with widespread usage of the various facets of ICT bringing familiarity and mastery of the ICT skills to the extent of producing highly acclaimed products (students).

However, Blurton (1999) acknowledges the difficulties in implementing ICTs and is aware that whatever is said about ICT in education quickly becomes out-dated as the technologies and educational applications continue to swiftly progress bit by bit. Despite the rapid changes that come with technological developments, Meenakshi (2013) has indicated that countries must still be able to benefit from technological development by inculcating sound ICT skills. Technological developments lead to changes in the work and changes in the organization of work. Thus, competencies are therefore always changing to meet current jobs' requirements.

On the whole, this necessitates well equipped environments with desired ICT gadgets for best practice. However, Yeboah and Djan (2013) assert that the goal of entirely incorporating ICT in education seems very slow and that institutions of higher learning need to take center stage in ensuring that members of the society get the required competencies. Extension services for those out of school can be of vital importance.

Meenakshi (2013) has indicated that ICTs can empower both lecturers and students. Of the lecturers he consulted on ICT adoption, they were of the opinion that continuous use of every new ICT gadgets adequately enabled them to disseminate any ICT skill to students. But, in most developing countries, ICTs are still in their infant stages and have not yet been advanced to the levels being experienced in developed countries. Indications are that research in the area of ICTs need to be increased so as to unpack the seemingly untraded ground. It is clear that more researches need to be conducted to appreciate the intricate relations between ICTs, research, teaching and learning as there is little documentation available on the area. Yeboah and Djan (2013) have indicated that there should also be research into the current trends of ICT facilities in institutions of higher learning and what students want before any ICT facility that suits their needs is availed.

Graduates from institutions of higher learning should display high levels of mastery of ICT skills so as to be the pole-bearers of technology to society. Academics and Academic support staff need therefore to be well equipped with appropriate ICT technologies for continuous support of students' learning. The need to churn out quality graduates who are able to utilise all key 21st century ICT skills becomes vital. More often than not, challenges of connectivity, infrastructure development and resource availability have derailed institutions of higher learning to achieve excellence or produce quality graduates in the area of ICT. Institutions of higher learning therefore need transformative policies to enable them to benefit from ICT technologies. It is therefore recommended that they can partner with people in the diaspora to assist in developing ICT infrastructure, research, technology transfers, information exchange and training.

Factors affecting ICT Implementation

Ghulam et al (2010) highlighted that most developing countries are going through good and bad experiences in the adoption and use of ICTs for educational purposes due to a variety of factors hindering adoption. McManus and Wood-Harper, (2004) also concur with the same view when they explained that certain IT projects become runways as they fail to deliver their goals probably due to budgets overrun and failure to meet set time plans. Hence, the level of ICTs in most African universities is so far very low. Thus, Karklins and Tang (2011) have indicated that African nations' education policies have to tackle factors that impede adoption.

Several researchers have identified problems of ICT expansion, utilisation and integration into teaching, learning and educational governance. Among, the factors, the following have been seen being on the centre stage of affecting ICT adoption,

1. Resistance to accept new ICT skills and lack of awareness
2. Teacher competencies, negative attitudes towards ICTs and user frustration
3. Lack of coordinated approach to implementation
4. Availability of learning materials or ICT equipment and high rates of system non-completion
5. Lack of user-training
6. Lack of administrative and technical end-user support and lack of follow-up
7. Mismatches between technologies
8. Motivation of both students and staff
9. High costs of internet connectivity and bandwidth
10. Low investment in ICT infrastructure

McManus and Wood-Harper, 2004 further explain that there are expansion and utilization problems, which need to be dealt with as they crop up. Yeboah and Djan (2013) have also explained that another issue is lack of affordable and dependable internet connectivity with sufficient bandwidth and the human resource capacity to exploit the technology thereby making most universities in Africa lag behind in the global ICT context. As a result of these problems that hinder effective use of ICT in research, teaching and learning, universities have thus grappled with ICT development at different paces.

The magnitude of ICT adoption

Yeboah and Djan (2013) expressed that notable progress has been made in the spread of ICT in general, but impact on teaching and learning process is just beginning. In Zimbabwe, all the eleven state Universities, offer computer science programmes and computer courses for appreciation. They all have computer laboratories that are connected to the internet. However, the numbers of computers per laboratory are varied depending on the size of the University. The laboratories are manned by lecturers and technicians that are trained to teach basic computer studies and are trained to teach using ICT facilities such as projectors and screens. The investments in ICTs are progressing at different rates and paces which affect delivery. Some universities are already way ahead on student online registration while others are still to reach that stage of doing away with large registration queues.

Loki et al (2014) indicated that the increasingly technology-rich world raises new concerns for education and expects universities to be the forerunners of the knowledge society. ICTs are vital for improving the teaching and learning process. However, the bulk of lecturers rated the computer equipment and resources found in their Universities lowly. They felt it had not improved to reach international standards. Thus, the need to meet current ICT needs by universities is paramount. Lau and Sim (2008) have indicated that mechanisms need to be put in place to ensure that lecturers utilize available computer technology for further development and communication. Training, sabbatical and contact leave postings should help increase lecturers' acquaintance with a wider range of ICT appliances.

Mikre (2011) states that ICTs should make curriculum implementation learner-centred with a self-learning environment that enables the student to customize his/her own learning experiences. This in itself helps institutions of higher learning to assist to produce more independent students who can operate freely.

It is against this background that this paper seeks to establish the magnitude of ICT adoption as well as the level of computerization and how staff and students are skillful and knowledgeable of ICT facilities that support the educational process at institutions of higher learning in particular Bindura University of Science Education.

Objectives of the paper

To assess the extent to which ICT has been adopted in institutions of higher learning in Zimbabwe a case of Bindura University of Science Education.

Research Methodology

The study used the survey design. Information was collected from participants of the selected population by use of a questionnaire. The population of the study composed of 20 University staff members and 20 Masters' students from Bindura University of Science Education in Zimbabwe. Questionnaires, interview schedules and observations were used to gather information. The questionnaire was the main research instrument and the data collected was coded and converted into easy to understand tables to draw meaning out of the data.

Data Presentation, Analysis and Discussion

The results were discussed in relation to the research questions.

Availability of ICT Facilities

Participants were asked to name the ICT facilities that were available at the University. The following facilities were largely identified by both staff (100%) and students (85%) that is; computer laboratories, desktop computers, smart technologies in some classrooms, lecture capture equipment, Laptop, I pads I phones, Server rooms, tablets, internet (Broadband/Wi-Fi), radios, LANs, telephones, optic fibre equipment.

On the extent to which participants were knowledgeable of the ICT facilities, staff (95%) largely identified most of the facilities, while students (80%) mainly singled out the laptops, I pads, phones, and tablets probably due to the fact that they were students' basic means for internet surfing.

On the other hand, the extent to which participants were knowledgeable of ICT skills was obtained as shown in Table 1 below.

Table 1: Knowledgeable of ICT skills

	Highly skilled	**%**	**Skilled**	**%**	**Barely Skilled**	**%**	**Unskilled**	**%**
Word Processing	35	85	4	10	-	-	1	5
Database Management	36	90	4	10	-	-	-	-
Email	38	95	2	5	-	-	-	-
Information Retrieval	38	95	2	5	1	5	-	-

From the table, participants were mostly knowledgeable of email and information retrieval skills, a sign that most participants were computer literacy.

While, on contribution of ICT facilities and associated software offered to individual programme objectives, most staff (95%) indicated that the ICT facilities and software packages available were not adequate. For example, handy software packages such as up to date Minitab Statistical Software (MSS), SPSS and TOra needed to be made available. These were required for teaching and learning. On the other hand, all the twenty (100%) students indicated that the Faculty lacked some of the key software packages required for their learning. However, from the interview with ICT personnel, it was stated that the issue of licenses and foreign currency were the major limiting factors affecting procurement of requisite packages. This meant that ways to circumvent such challenges needed to be put in place.

Most utilized ICT facilities

A question on which ICT facilities were mostly used was paused and the following results were obtained as shown in Table 2 below.

Table 2: Most utilized ICT Facilities.

Category	**Staff**	**%**	**Students**	**%**
Internet	20	100	19	95
E-mail	20	100	17	85
Student Record System	15	75	0	0

E-learning	10	50	20	100
Basic Computers	20	100	20	100
Microsoft Office	20	100	20	100
Projectors	16	80	3	15
IUMS	14	70	20	100
Smart phones	12	60	10	50
Tablets	5	25	4	20
Laptops	15	75	16	80

All the staff 20 (100%) indicated that basic computers, Microsoft office, internet and email facilities were popular in use. While students 20 (100%) indicated basic computers, Microsoft office, e-learning and IUMS. Very few staff 5 (25%) indicated that tablets were not mainly utilized among the group may be due to the availability many other gadgets.

Adequacy of ICT Facilities in the Faculty

Table 3 below presents findings on the adequacy of ICT facilities in the Faculty as perceived by members of staff and students.

Table 3: Adequacy of ICT Facilities

	Adequate	%	Inadequate	%
Staff	1	5	19	95
Students	0	0	20	100

Most staff members (95%) and students (100%) indicated that ICT facilities at the Faculty were not adequate. It was highlighted that computers available were not enough for the number of students in the faculty, while the lecturers largely depended on their personal laptops.

On the adequacy of internet connectivity at the university, it was vehemently responded that it was not adequate (staff/students 100%). More access points were required, It was also noted that connectivity outside the campus premises was dismal as there was no secure Wi-Fi.

Factors Limiting ICT Infrastructure at the Faculty

On factors limiting ICT infrastructure at the Faculty, the following factors were identified by both staff and students as follows:

1. Electricity outages/blackout
2. Lack of internet connectivity
3. Low bandwidth
4. Limited internet skills and competencies
5. Network changes
6. Lack of funds
7. Resistance to change
8. Inadequate ICT staff
9. Weak ICT infrastructure
10. Limited choice of ICTs that help individuals achieve personal goals

These factors revealed that ICT was not yet smooth sailing at the University. It was also highly emphasised that there was a lot of network congestion during the day due to large numbers of students that would be on campus which normally slowed down the internet speed.

Factors Limiting Research in the Faculty

On the factors limiting research, the following factors listed below were identified.

1. Lack of knowhow
2. Network congestion
3. Failure to access journals due to frequent interruptions on Wi-fi
4. Poor research skills
5. Low research interest
6. Poor bandwidth with inadequate internet
7. Limited internet skills and competencies
8. Lack of research knowledge
9. Lack of computers
10. Weak ICT infrastructure
11. Inadequate data books and devices to collect information

The findings show that quite a number of factors largely identified affected the research output for the faculty.

Effects of lecturers not using ICT today and the near future

Participants were asked to explain the consequences of not using ICT infrastructure by lecturers and the findings were stated in Table 4 below.

Table 4: Effects of lecturers not using ICT today and the near future

	Staff	**Students**
Outdated skills and content	90%	60%
Mismatch between industry needs and what is taught	100%	80%
Poor or no relevant research output	85%	60%
Disadvantage students and costly	90%	100%

The majority of staff 20 (100%) indicated a mismatch between industry and what is taught by the lecturers most probably due to the fact that the lecturers not using ICT were born before computers and were not well conversant with ICT skills and content. Suggestions for not wasting students' time were pointing to the need to ensure recruitment of lecturers with requisite ICT skills and content. On the other hand, all the students (100%) felt that being taught by lecturers not using ICT would mainly disadvantage them and it would prove costly as they would be required to fork out more cash in trying to gain the untaught skills.

Funding of ICT Infrastructure

Participants were asked to suggest possible funding provisions of ICT infrastructure at the university and the following results were obtained as shown in Table 5 below.

Table 5: Funding of ICT Infrastructure

	Staff	**%**	**Students**	**%**
A percentage of student fees going towards ICT provisions	19	95	2	10
Partnerships with service providers/NGOs	20	100	16	80
Grant proposal/Donation	12	60	10	50
ICT Levy administered every semester	20	100	1	5
Consortia of Universities for reduced cost of ICT	17	85	16	80
Bring Your Own Device (BYOD)	4	20	17	85
Student Schemes	14	70	12	60

All lecturers (100%) were for an ICT levy administered every semester and Partnerships, though only (5%) students were for an ICT levy probably indicating that a levy could be an extra burden. Very few lecturers

(20%) supported the idea of bringing own device strategy. It appears that most lecturers were not comfortable with this idea probably due to fear of exposing personal information.

A question on ICT usage at the Faculty was asked to assess the extent ICT adoption and the results were analyzed as follows.

Table 6: ICT usage

Category	Widely used	%	Limited	%	Very Limited	%
Staff	12	60	6	30	2	10
Students	16	80	4	20	0	0

The majority of students 16 (80%) indicated that ICT was widely used among students with very few with limited usage probably due to their poor ICT educational background. Lecturers 12 (60%) concurred with students that ICT was widely used. However, eight lecturers (40%) had limited ICT usage most probably due to the fact that they were the older lecturers not well versed with computers.

On further probing on the matter of ICT usage through interviews and observations, it was highly mentioned that students abused the use of ICT as it was mostly entertainment and person to person communication via social media which slowed the internet browsing speed. It was also noted that ICT usage varied according to nature of work as some of the users were already at the end of the adoption stage while others were now moving towards the transformative stage of the ICT continuum. This can be another gap for research to look at the various levels of ICT adoption in relation to members' knowledge and skills on ICT.

It was further noted from the ICT department that ICT usage could be described as per the various categories of employees, where indications were that Administrative support staff were on 80% usage while Academics were on 50% usage and students at 90% usage. It was also noted that the move from hard to soft communication had not changed much as flow of paperwork was still high and had not been reduced much.

Recommendations

The adoption of ICTs in institutions of higher learning requires vibrant systems that enable the sound technological transfers to students for the benefit of society. The following recommendations to ensure ICTs rapidly spread for the good of research, teaching and learning are hereby made.

1. Government and Policy makers should encourage the implementation of ICT programmes in Universities, schools and the community to encompass everyone in ICT literacy. In Zimbabwe, the national ICT Policy was reviewed to be in line with current technological developments and education was placed at the centre stage for embracing ICT technology.
2. Lecturers should be conscious of 21st century ICT skills and be well versed in them and their application into the world of work.
3. Providing a curricular that aims at improving quality in ICTs. Hence the need to review ICT competencies and skills to identify the gaps.
4. Universities should make available equipment such as computers and laptops, to both staff and students so that they embrace ICT and encourage networking between staff and students. This helps to ensure that a digital culture is seeded encompassing teaching research and extension service. The need for zero tolerance of substandard ICT products is called for and thus, the Standard Association of Zimbabwe is tasked to ensure that importers and suppliers of ICT equipment comply so s not to short change organisations.
5. Universities need to ensure that they provide and maintain sound budgets for ICT equipment so as to get current equipment and move with the times since equipment keeps changing. Through sound budgets in ICT, support services can also be timely available for programmes to run as scheduled thereby avoiding disruptions.
6. Training programmes should be developed for Academics and Academic support staff as well as continuous staff development to enhance their performance. There is need to have effective in-service training of staff born before computers to appraise them on the ICT gadgets so that they can fully appreciate new technologies. As part of the new initiative of the transformation process, Universities are required to review ICT teaching methods and students' learning experiences to be able to produce employable graduates and entrepreneurs in the area of ICT.

7. In addition, training programmes for students also need to be established so as to expose them to the ICT gadgets that are in use. The need to have compulsory on campus training centers with WiFi and easy internet connectivity for computer literacy is vital. There is also need to capture the interest of students and motivate them to study ICTs. The timetable for students should be flexible enough to incorporate all the ICT skills to be learnt.
8. It is also important to note that research and intellectual expositions that are done by universities should also focus on researches in ICT. This will help in finding answers to the major ICT related problems universities are facing.
9. Networking for ICT development is crucial and creation of knowledge society blocks or consortiums. Thus, universities must collaborate with industry in order to assist in finding solutions to challenges industry is facing. The need to work in line with the interests of various businesses is vital for creation of project ventures.
10. Above the rate of unemployment has been rising in many countries, Development of community ICT centers may go a long way in providing communities and youths place where they can convene to access information. These need to be fully fledged with all ICT gadgets.
11. Universities must identify strategies that transform the mindset of people and develop an academic culture for everyone to fully utilize ICT and be able to contribute to the developmental initiatives of the country.

Conclusion

The magnitude of ICT adoption in institutions of higher learning seems to be taking its toll. Successful cascading of skills from staff to students is continuously going on in bid to skill them. The students are thus, required to show their problem solving, collaborative and creative skills in the real world using ICT. Transformative policies enabling students to benefit from ICTs need to be put in place.

References

1. Ekeke, H.J.T., and Mbachu, C.E. (2015), The Place of Information, Communication and Technology (ICT) in Teaching and Learning in Nigerian Tertiary Institutions; http://pubs.sciepub.com/education/3/3/13/index.html Accessed 20/10/17
2. Ghulam Muhammad Kundi, Allah Nawaz, Shadiullah Khan. (2010). The predictors of success for e-learning in higher education institutions (HEIs) in N-W.F.P, Pakistan http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1807-17752010000300004 Accessed 20/10/17
3. Karklins, J., and Tang, Q. (2011). UNESCO ICT Competency Framework for Teachers. unesdoc.unesco.org/images/0021/002134/213475e.pdf Accessed 20/10/17
4. Kwabena Obiri-Yeboah Collins Fosu, Roderick Kyere-Djan. (2013). Exploring the Trend of ICT Adoption in Tertiary Institutions in Ghana: A Case Study at Kwame Nkrumah University of Science and Technology (KNUST): Information and Knowledge Management www.iiste.org Accessed 14/10/17
5. Lau Bee Theng and Sim Chia Hua. (2008) Exploring the extent of ICT Adoption Among Secondary School Teachers in Malaysia School of Computing and Design, Swinburne University of Technology Sarawak Campus, Malaysia http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.372.5339&rep=rep1&typ Accessed 20/9/17
6. Lokesh Utakarsh. (2013). EdTech Review Technology and its' role the 21st century education http://edtechreview.in/trends-insights/insights/277-role-of-technology-in-21st-century Accessed 14/10/17
7. McManus, J., and Wood-Harper, T. (2004). Information systems project management: Methods, tools and techniques. Pearson Education, Limited: UK. http://vig.pearsoned.co.uk/catalog/academic/produc.... Accessed 21/10/17
8. Mikre Fisseha. (2011). The Roles of Information Communication Technologies in Education Review Article with Emphasis to the Computer and Internet https://www.ajol.info/index.php/ejesc/article/view/73521 Accessed 20/9/17

9. Ron Oliver. (2011). The role of ICT in higher education for the 21st century: ICT as a change agent for education https://wenku.baidu.com/view/ab4dea6cb84ae45c3b358c58.html Accessed 20/9/17