

REASSESSMENT OF THE ADOPTION AND INTERGRATION OF ICTs TO ENHANCE TEACHING AND LEARNING IN ACADEMIC PROGRAMMES IN MOI UNIVERSITY KENYA

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Abstracts: This research was a reassessment of the level at which one of Kenyan universities have reached in the adoption and integration of Information Communication Technology in their academic programs to enhance teaching and learning practices. The main purpose of this was to investigate the progress in this area since 2009 when I conducted a related research in Moi University in Kenya. It is important to note that this research started by assessing the basics of ICTs adoption in 2009 which included ICT infrastructure, ICT hardware, software & information system, human resource and ICT Security which is always the initiation stage. ICT strategies and ICT plans should be continuously evaluated to align with institutional visions and missions in order to achieve effective use of ICT in their academic programs in preparation for the future human resource in various fields where they will be required to work. This study adopted Descriptive research design as a framework that guided the entire research process. The study was informed greatly by the theory of Marcus theoretical model of adoption and Continuum approach model. The data was collected through observation, the use of questionnaires and interviews. The data collected was analyzed qualitatively and quantitatively. The findings of this study acts as an ICT needs analysis and it will enable the university and other similar universities in East Africa to enhance acquisition, adoption and integration of ICTs in their academic programs.

Keywords: Adoption, integration, Information Communication Technology, teaching, learning, emerging, emerging, infusion and transformation.

1. BACKGROUND INFORMATION

The modern paradigm in the preparation of human resources is based on the consumer perspective and the ability of an institution to provide personnel that will meet the dynamics needs of the society is presently a great concern to all the investors. The current world is driven by the complexity of the ICTs and therefore every serious institution of learning bestowed with the preparation of youths to meet the present industrial and organizational demands through the adoption, integration and infusion of ICTs in their production of goods and services is on high demand. The rapid growth in Information Communication and Technologies (ICT) have brought remarkable changes in all dimensions of human life in the twenty-first century, as well as affecting the demands of modern societies. This complex and dynamic phenomena therefore calls for an urgent need for the institutions of higher learning to fully adopt and integrate ICTs into their teaching and learning program. This will ensure effective preparation of their products (students) to meet the dynamic technological needs of the current digital world. Due to frequent development and changes in the area of ICTs ,the system need to be always evaluated or reassessed to check its progress and relevance.

According to Tomei (2005), ICT is becoming increasingly important in our daily lives and in our educational system. Therefore, there is a growing demand on educational institutions to use ICT to teach the skills and knowledge students need for the 21st century. This important idea should be prominently featured in the instructions of higher learning. Realizing the effect of ICT on the workplace and everyday life, today's educational institutions try to restructure their educational curricula and classroom facilities, in order to bridge the existing technology gap in teaching and learning. This restructuring process requires effective adoption of technologies into existing environment in order to provide learners with knowledge of specific subject areas, to promote meaningful learning and to enhance professional productivity. According to Magambo (2012), both developed and developing countries are undertaking a key vital task of streamlining their education and training systems to meet the development requirements in the context of changing environment. ICT for education is more critical today than ever before since its growing power and capabilities are triggering a change in the learning environments available for education. The use of ICT offers powerful learning environments and can transform the learning and teaching process so that students can deal with knowledge in an active, self directed and constructive way (Volman & Van Eck, 2001; de Corte et al., 2003). At present ICT is considered as an important means to promote new methods of instruction (teaching and learning). It should be used to develop students' skills for cooperation, communication, problem solving and lifelong learning (Plomp et al., 1996; Voogt, 2003). Although computers and technology are prevalent throughout our society (Cuban, 2001), developing countries are far from reaping their benefits because of certain barriers. In Kenya context, the Ministry of Education in collaboration with partners developed Kenya Education Sector Support Programme (KESSP), where Information and Communication Technology (ICT) featured in 2005 as one of the priority areas identified in this sector programme. ICT in the education sector can broadly be categorized in: E-Government which aims at mainstreaming ICT in all government operations and service delivery; EMIS (Education Management Information Systems) which aims at facilitating education managers and administrators with accurate and timely data for better and informed decision-making; and E-Learning which aims at mainstream ICTs in the teaching and learning process (ICT as a tool).

2. THEORETICAL FRAMEWORK

This study was informed by two models namely:

- Marcus theoretical model of adoption and
- A Continuum of approach model

Marcus's Theoretical Model of Adoption:

This particular model is relevant to this study based on its guideline procedures on what influences adoption process. Anken (2004) describes Marcus's theoretical model of adoption that has been derived from the diffusion of innovation theory and the social learning theory. Marcus's model highlights the importance of innovative behavior and the phenomenon of others modeling themselves on this. The attitude drives behavior in many areas of life and it is the behavior that determines implementation and utilization of any facility or technology. Communication channels are a vital component in spreading this modeling behavior to other potential adopters. This study tested the attitude of the university leaders towards their seriousness in the area of ICTs progress in their academic programs. Anken (ibid) explains how the model sets out a range of influential factors/variables in the take-up of innovations including:

- The associated 'costs' - personal and institutional
- The availability of necessary 'resources' - money, equipment, training, time, prior experience and relevant skills
- The 'value' of the innovation.

It is worth noting that the three parameters above were assessed to find out if they have influenced the present status of ICT adoption in the university. In most of the developing nations the associated cost of implementation and the cost of ICT resources are the main hindrances. This illustrates the need to bring together a mix of personal and institutional factors for optimal take-up of innovations. Those factors relating to the institutions' ability to provide the conditions conducive to the introduction and acceptance of IT innovations could be used to map out an institutional framework for adoption. The associated cost of technology acquisition and the availability of necessary resources namely money, equipment, training, time, prior experience and relevant skills were the main militating factors against the availability and utilization of ICTs in Kenyas higher institutions of learning. This time round the same issues were investigated to check if they have been addressed based on the earlier recommendations

A Continuum of Approaches:

According to this continuum approach model, the development of ICTs in schools falls into four stages namely the emerging, infusion, application and transformation level. These levels functionally are infusion and adoption approaches. Studies of ICT development in both developed and developing countries identify at least four broad approaches through which educational systems and individual schools proceed in their adoption and use of ICT. These four approaches, termed emerging, applying, infusing, and trans-forming, represent a continuum depicted as the model that measures the level of ICT availability, adoption and integration in institutions of learning.

Structure of the Continuum Model:***The emerging approach:***

Schools at the beginning stages of ICT development demonstrate the emerging approach. Such schools begin to purchase, or have had donated, some computing equipment and software. In this initial phase, administrators and teachers are just starting to explore the possibilities and consequences of using ICT for school management and adding ICT to the curriculum.

Schools at this emerging phase are still firmly grounded in traditional, teacher-centred practice. The curriculum reflects an increase in basic skills but there is an awareness of the uses of ICT. This curriculum assists movement to the next approach if so desired. The first study by Langat (2009) had revealed that Moi university was in this emerging level of ICT adoption.

The applying approach:

The next level consist of those schools in which a new understanding of the contribution of ICT to learning has developed exemplify the applying approach. In this secondary phase, administrators and teachers use ICT for tasks already carried out in school management and in the curriculum. Teachers largely dominate the learning environment.

Schools at the applying approach phase adapt the curriculum in order to increase the use of ICT in various subject areas with specific tools and soft- ware. This curriculum assists movement to the next approach if so desired.

The infusing approach:

At the next stage, the infusing approach involves integrating or embedding ICT across the curriculum, and is seen in those schools that now employ a range of computer-based technologies in laboratories, classrooms, and administrative offices. Teachers explore new ways in which ICT changes their personal productivity and professional practice. The curriculum begins to merge subject areas to reflect real-world applications.

In support of this stage, Adedokun-Shittu,(2012) argued that integration is the last component of the Technology Assessment Model. According to the model, integration of IT in education can be done in some areas such as teaching and learning, assessment, curriculum, and also a blend of the technology based teaching and learning methods with the traditional methods. This study however only concentrated on the integration of ICT into teaching and learning

The transforming approach:

Schools that use ICT to rethink and renew school organization in creative ways are at the transforming approach. ICT becomes an integral though invisible part of daily personal productivity and professional practice. The focus of the curriculum is now learner-centred and integrates subject areas in real-world applications. ICT is taught as a separate subject at the pro- fessional level and is incorporated into all vocational areas. Schools have become centres of learning for their communities. The rapid developments in technology have made tremendous changes in the way we live, as well as the demands of the society. Recognizing the impact of new technologies on the workplace and everyday life, today's teacher education institutions try to restructure their education programs and classroom facilities, in order to minimize the teaching and learning technology gap between today and the future. This restructuring process requires effective integration of technologies into existing context in order to provide learners with knowledge of specific subject areas, to promote meaningful learning and to enhance professional productivity (Tomei, 2005).

However, many recent research studies on this theme shows that many institutions are failing to integrate technology into existing context. Bauer & Kenton (2005) stated in their study that although teachers were having sufficient skills, were innovative and can easily overcome obstacles, they did not integrate technology consistently both as a teaching and

learning tool. Based on this finding it is also good to find out why ? teachers are unable to integrate ICTs despite their willingness. In connection to this is the observation by Gülbahar (2008) in his study that although pre-service teachers are willing to use technology it rarely occurred because of the inadequacy of lessons to facilitate them with necessary skills to be technology competent teachers. Reynolds, Treharne & Tripp (2003) also underlined continuing problems in the adoption of ICT by teachers and stated the need for further research on how ICT can improve education.

3. LITERATURE REVIEW

The literature reviewed in this context fall under the following areas; What ICT means in the context of education, importance of the infusion and integration of ICTs in institutions of higher learning, the ICT Policy in Kenya, general factors hindering the progress and necessary steps that other countries have taken to address such issues.

What is ICT in this context?

It is very important in this onset to note that the meaning of ICT has taken different version however in this context of education, ICT stand for information and communication technologies and is defined, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. In education therefore it encompasses any hardware and software technology that contribute in the educational information processing. In the context of present era, ICT mainly comprises of Computer technology with its hardware, like, Personal computer machine, infrastructure required for setting up Internet facility and also software like, CD ROM including various program packages for E- learning strategies etc.

In a much focused way towards administrative function, ICT means any Information Technology that focuses on the acquisition, storage, manipulation, management, transmission or reception of data required for the educational purpose. For example, the information about students' records, their admissions, updates of their auricular and co-curricular activities.

While ICT in the teaching and learning process, it mean any technology that deals with the exchange of information or in other words communication in the teaching learning process. Uses of Electronic learning technology like, Teleconferencing, power point presentations, CD ROM are Communication Technology which is the part of ICT in the context of communication instruction.

Importance of ICTs Infusion/Adoption Universities:

Universities all over the world are responsible for the creation/innovation and dissemination of knowledge through research and teaching. The current paradigm is global perspective in the field of research and sharing of knowledge. Every teacher today should be aware that the world of business and industry is driven by customer satisfaction. Everything is consumer centred and therefore education sector should not think otherwise. The students they are preparing are no longer limited to the provision of national workforce but global workforce. In other words the university education design should move from teacher centred design to learner centred design and even far much better to the global consumer design. As Abaidoo and Arkorful (2014) argued that the role of education traditionally has always been the preparation of people to live and work within their own society. However this traditional role has changed due to Globalization of world economies and also the introduction of new and sophisticated information communication technologies which are continuously placing much pressure upon institutions of learning as governments, employers and students are obviously expecting them to have solutions to national and international problems. One greatest element of globalization is ICT. It is currently common knowledge that globalization and technological changes have created a new global economy engineered by technology, fueled by information and driven by knowledge. Therefore any institution that need to be part of the global world in education and commerce must start infusing/adopting technology into their teaching and learning practices. ICTs also makes teaching and learning easier more realistic and enhance comprehension. It was also observed by Langat 2009 that Information technologies cannot not replace the emotional and humane role of the teacher in class but it complement the work and enhance creativity among the learners. The integration of learning technologies into high school classrooms is being promoted and supported around the world. Underlying the promotion and support are claims that successful integration will lead to enhanced learning outcomes (UNESCO, 1998). Fox (2005) stated that technology is being fused into the schools and its ongoing is unstoppable, and necessary.

It is also important to note that ICT is very cost effective especially teaching and learning through Video conferencing. Implementing ICTs is becoming a mainstream in education and is believed to empower both teachers and students by making the educational process more interactive. According to Pelgrum (2001) "It seems that the current belief is that ICT is not only the backbone of the Information Society, but also an important catalyst and tool for inducing educational reforms that change our students into productive knowledge workers". Pearson & Somekh, (2006) observed that such institutions are turning to Information and Communication Technology (ICT) for many of these answers. According to Krishnaveni and Meenakumari (2010), in the growth-oriented industry, change has been going on at rapid rate, and the education sector is no exception. In fact to realize effective e-governance and e-commerce in Kenya and other parts of African countries-learning should be promoted. The ever rapid growth in the field of ICTs and education is the magic behind effective administration in the academic. Tremendous improvement in technology which has led to far-reaching developments in the administrative system has been witnessed in the 21st century (ibid). Usage of ICT in school has become an inherent part of teaching and learning, both in and out of the classroom. Excuses of any kind for failure to prioritize ICTs in the institutions of higher learning is equal to denying the present generation their rightful global position and competition. With numerous resources that are being spent on ICT in schools, the integration and impacts of ICT on teaching and learning has been of serious concern among government policy makers, leaders of schools, teachers, as well as researchers globally. According to Edumadze and Owusu (2013), the introduction of ICT and its incorporation into the educational system, especially the tertiary educational system, targets to improve the teaching and learning processes, and yet there has been much difficulty for lecturers and students in their use of the technology.

In this context, advantages of ICT in education can be listed down summarily as follows:

- Quick access to information: Information can be accessed in seconds by connecting to the internet and surfing through Web pages.
- Easy availability of updated data: Sitting at home or at any comfortable place the desired information can be accessed easily. This helps the students to learn the updated content. Teachers too can keep themselves abreast of the latest teaching learning strategies and related technologies.
- Connecting Geographically dispersed regions: With the advancement of ICT, education does not remain restricted within four walls of the educational institutions. Students from different parts of the world can learn together by using online, offline resources. This would result in the enriching learning experience. Such collaborative learning can result in developing... • divergent thinking ability in students, • Global perspectives • respect for varied nature of human life and acculturation
- Facilitation of learning: ICT has contributed in shifting the focus on learning than teaching. ICT helps students to explore knowledge to learn the content through self study. Teacher can help the students by ensuring the right direction towards effective learning. Situational learning, Programmed learning, many Online learning courses are some of the example of self learning strategies that are being utilized with the help of ICT.
- Catering to the Individual differences: ICT can contribute in catering to individual needs of the students as per their capabilities and interest. Crowded class rooms have always been a challenge for the teacher to consider the needs of every student in the class.
- Wider range of communication media: With the advent of ICT, different means of communication are being introduced in the teaching learning process. Offline learning, on line learning, blended learning are some of the resources that can be used in educational institutions. Collaborative learning, individualized learning strategies can enhance the quality of group as well as individual learning. With the real society. This can ensure the applicability of knowledge.
- Wider learning opportunities for pupils Application of latest ICT in education has provided many options to the learners to opt for the course of their choices. Many Online courses are available for them to select any as per their aptitude and interest. Students can evaluate their own progress through different quizzes, ready to use Online tests. This can ensure fulfillment of the employment required in the job market thus minimizing the problem of unemployment. It can also provide more efficient and effective citizens to the society as per the changing needs.

- Technology promotes collaborative – team learning. In another development, Sangowus cited by Attama and Owolabi (2008) maintains that ICT is very useful in corporate environment because it promotes performance and improves efficiency.
- Higher education institutions, especially those in the West, have adopted ICT as a means to impart upon students the knowledge and skills demanded by 21st century educational advancement (UNESCO, 2002). According to UNESCO (2002), ICT now permeates the education environment and underpins the very success of 21st century education. ICT also adds value to the processes of learning and to the organization and management of learning institutions. Technologies are a driving force behind much of the development and innovation in both developed and developing countries. As such, all countries must seek to benefit from technological developments. To be able to do so, professionals (including faculty) have to be educated with sound ICT backgrounds, independent of specific computer platforms or software environments, to meet the required competencies of the ever-changing global environment.
- When ICT in education does not achieve expected goals or when it introduces complicated educational reforms, students and teachers can lose focus on the essentials and become distracted by the rapidly changing technologies themselves. This result is likely when students and teachers have not been able to acquire a full understanding of the technologies, the role ICT plays and where, how and what technology to use. When the meaning of ICT and its unlimited potential in the educational arena are understood, rapidly changing technologies are not seen as overwhelming, but as enablers of greater critical thinking and problem solving in education (Iloanus & Osuagwu, 2009).

Adoption and integration of ICTs into mainstream curriculum:

This is a very important stage that defines availability of ICTs resources and their different functions. In fact most of the early studies were on the area of availability and most of the institutions of higher learning have acquired the ICT resources required. It is therefore notable that most of the institutions of higher learning have these tools or can afford these tools. However, Belland, (2009) argued that despite this belief, there have been notable complaints that the growth of ICTs has not been accompanied by an equal growth in technology integration in classrooms. The truth is that these particular ICT facilities are being used for two purposes firstly is preparing, processing and keeping administrative record and secondly is the use of the when teaching and learning courses related to computer studies in the universities or in some universities offer them almost theoretically as one of the independent course unit. In this focused attempt to understand the key areas in the integration process, different scholars have different arguments. Painter, (2001) observed that regardless of the quantity of technology placed in classrooms, the key to how those tools are used is the instructor. The majority of instructors believe technology usage is important for teaching, however, lack confidence and understanding during integration process. Furthermore, instructors should possess the skills and competencies essential for designing, delivering and evaluating instruction, since “Successful integration of technology requires not only the knowledge of the technology and its potential use but also the skill to plan and execute a good lesson (of which the technology is only a part)” (Painter, 2001, p. 23). When technology usage is aligned with the instructional goal, where technology is integral to teaching, successful integration might be succeeded. . Otherwise, the use of technology alone is not a sufficient indicator of integration. Therefore, “teacher educators need to place instructional technology education within the context of teachers’ work in the classroom” (Mayo, Kajs & Tanguma, 2005, p.12) Wang, Ertmer & Newby (2004) concluded about this topic “...as our future teachers achieve high confidence levels for technology implementation, meaningful technology use can come closer to being the norm, rather than the exception, in our K-12 classrooms” (p. 242). Deaney, Ruthven & Hennessy (2003) also considered three major points for using ICT: the need for wider skills for effective use of tools, the need to focus on the power of technology and the need to shift familiar patterns of classroom interaction by introducing technology.

It is also important to go beyond the narrowed attempt of highlighting on the administrative and instructional functions of ICTs and explore on its research and innovational functions as observed importantly as. “Most of the discussions and initiatives on ICT in Education tend to focus on the use of ICT for teaching and learning only (The Commonwealth of Learning, 2006; Becta, 2004; Akale, 2003). This emphasis on instructional applications of ICT in education has an antecedent. From the earliest times, educational interest in technology has always centred on the instructional application of such technology to improve teaching and learning. The case of the computer provides a perfect illustration of this point. Long before the emergency of ICT, educational interest in the computer centred on its instructional applications as exemplified by computer-assisted instruction (CAI), computer-aided testing (CAT), etc.

It is perhaps easy to understand why the emphasis at the basic and secondary education levels should exclude research application of ICT. The primary responsibility of the teachers at these levels is defined exclusively in terms of teaching. However at the higher education level, teachers primary responsibility is of a tripartite nature involving teaching, research and community service. In effect it can be suggested here that any approach to ICT adoption at the higher education level that stressed only instructional applications and ignores research applications, will be grossly inadequate in meeting the needs of both students and teachers:

The indispensability of ICT in education research in particular includes:

- Learning how to optimize the creativity of African Scientists through participation in international networks and working with data sets.
- Accessing various kinds of research information, which would necessitate a link to the libraries group
- Learning new methods for disseminating knowledge produced in Africa and using them.
- ICT applications run through the entire gamut of the educational research process. The advocacy for the indispensability of ICT in educational research can be further strengthened by the following arguments that tend to underscore the values derivable from applying ICT in educational research.
- It reduced time and cost of conducting educational investigation.
- Data sets and library resources can be shared by institutions in different locations
- Educational researchers have easy access to current literature materials
- Data sets, irrespective of size can be stored and retrieved when needed.
- Researchers in different locations can collaborate more easily, etc (Nworgu, 2007).

Ijafuyi and Adebajo (2006) while speaking on the usefulness of ICT in sustainable development advised on the need for a well-equipped ICT centres in all educational institutions to enable them live up to their social and political responsibilities.

ICT Policy and development in Kenya:

It is important to understand policy framework guiding the position and development of any project in any sector. In fact policy drives the development of any project and therefore it is important to understand the present ICT policy guideline in the education context before anything else. Research also like this will act as a needs assessment tool that will be used by policy makers to improve on the present position of ICTs in higher institutions of learning. Moreover ICT policy sets out the rationale for the teaching and learning of ICT and the aims and objectives for ICT use within the ethos and wider frameworks of the school. It gives clear guidance on the types of equipment, programs and measures that need to be in place if the requirements of the policy are to be met. The central aim of the policy is to provide a broad, balanced and challenging range of ICT opportunities for the students to effectively prepare them for a future role in society.

The Kenya National ICT policy was adopted in 2006 after several years of effort in trying to put it in place. The aim of the policy was to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services as reported in the ICT in Education option paper (Kenya. MoEST, 2005). Although the national ICT policy has several sections, objectives and strategies regarding ICT in education are spelt out in the information technology section. In this section, the objective regarding the use of ICT in schools, colleges, universities and other educational institutions to improve the quality of teaching and learning is spelt out as documented by Farrell in the Survey of ICT in Africa Report (2007). One important strategy outlined in this report is the promotion and development of specific e-learning resources that would address the educational needs of primary, secondary and tertiary institutions. A significant step in this direction is the digitization of the curriculum which is ongoing at the Kenya Institute of Education (Ratemo, 2009). Under the subtitle 'E- learning', the ICT policy goes on to outline the strategies that will be used in the promotion and development of ICT in teaching and learning. Other strategies outlined in The National Information & Communications Technology Strategy for Education and Training (Kenya, MoE, 2006) include:

- Promote the development of e-learning resources;
- Facilitate public-private partnerships to mobilise resources in order to support e-learning initiatives;
- Promote the development of an integrated e-learning curriculum to support ICT in education;
- Promote distance education and virtual institutions, particularly in higher education and training;
- Promote the establishment of a national ICT centre of excellence;
- Provide affordable infrastructure to facilitate dissemination of knowledge and skills through e-learning platforms;
- Promote the development of content to address the educational needs of primary, secondary, and tertiary institutions;
- Create awareness of the opportunities offered by ICT as an educational tool to the education sector;
- Facilitate sharing of e-learning resources between institutions;
- Exploit e-learning opportunities to offer Kenyan education programmes for export
- Integrate e-learning resources with other existing resource. These strategies seem to be dependent upon each other. For instance, whereas it was important to develop e-learning resources, it would be meaningless if there was lack of awareness, skilled personnel, facilities and public-private partnerships to support the e-learning initiatives.

Also, the development of the curriculum and training of teachers both at in-service and pre-service level may be central to the government's efforts of achieving the policy objectives. In an effort to promote the development of content that will address the educational needs of primary, secondary, and tertiary institutions, the government came up with two ways in which the curriculum will be developed (Kenya. MoEST ICT in Education options paper, 2005). One, by adapting existing educational materials and distributing them to the schools; and the second, by beginning the process of having schools create their own e-content. Besides, building capacity in Kenya to create instructional material for an increasing digital world is noted as an important aspect of the curriculum that is expected to pay dividends in improving the quality of education (ibid). In order to achieve this policy objective, the Kenya Institute of Curriculum Development (KICD) formally Kenya Institute of Education (KIE) has been singled out as the sole government body charged with the responsibility of developing the ICT curriculum as well as distributing the educational material. KIE would also be in charge of overseeing other institutions that develop appropriate e-content (Farrell, 2007). Objective number 10 of the MoEST strategic plan (running from 2006 to 2011) targets strengthening the capacity of KIE to execute this mandate among others (Kenya. MoEST,2006). This is a strong commitment in support of the National ICT policy.

Farrell (2007) asserts that while technicians can be employed to fix and maintain computers, teachers and educators must know how to exploit ICT for what it does best – opening learners up to the world of knowledge. The author also noted that investment into upgrading computer labs and building ICT capacity at the Teacher Training Colleges (TTCs) is an intervention which can quickly yield high returns. By providing adequate access to ICT, the TTCs can use it to achieve learning objectives at various levels. This point is also noted in the ICT in Education Options Paper (Kenya. MoEST, 2005) in which large-scale capacity building workshops for teachers have been suggested. The paper observes that teacher training should be built on existing structures that support quality ongoing professional development for teachers. The programme should be consistent with the workshops for lecturers and pre-service teachers at teacher training colleges. The paper further notes that the training of teachers should focus on increasing efficiency in the teachers' workload and integrating ICT to improve teaching and learning objectives. Yildirim (2007) conducted a survey on factors that discourage teachers' use of computer technology in classrooms. He reported that the major use of technology by teachers was to prepare lesson notes and assessments instead of improving students' performances. The research also revealed that barriers to the use of technology include congested classes, insufficient training, inadequate technical and pedagogical support, rigid school syllabi, inadequate motivation, lack of strong leadership and inadequate cooperation among teachers. Slaouti & Barton (2007) also claimed that lack of access, time pressures, lack of mentors and

Factors influencing teachers' adoption and integration of ICT:

Opportunities for training have effect on teachers' use of ICT in teaching and learning. Similarly, Chigona & Chigona (2010) employed qualitative approach to collect and analyze empirical data on factors preventing teachers from using ICT in teaching in Khanya schools in South Africa. Fourteen educators were sampled from four high schools and interviewed. The study revealed that inadequate training, lack of access to computer laboratories, lack of technical support and inadequate technology resources were factors discouraging teachers from implementing ICT into their teaching.

Also Peralta & Costa (2007) collected and analyzed data on teachers' confidence and competence in the use of ICT in teaching. The quantitative and qualitative research randomly sampled 20 teachers from Greece, Italy, Spain, Portugal and the Netherlands. The findings revealed that lack of teachers' time to learn new skills, old ICT equipment, large classes, number of computers available for pupils' use, lack of technical and pedagogical support and lack of collaboration among teachers were constraints to teachers' confidence and competence in the use of ICT. Understanding the extent to which these barriers affect individuals and institutions may help in deciding how they are to be tackled (Becta, 2004).

The rise of technologies has complicated its adoption and integration by teachers in classroom. The effective integration of technology into classroom practices poses a challenge to teachers than connecting computers to a network. For successful integration of ICT into teaching, the review has highlighted on factors that positively or negatively influence teachers' use of ICT. These are personal, institutional and technological factors. Research has revealed that these factors are related to each other.

On a personal level, there are numerous factors that influence teachers' use of ICT. Teachers' feelings, knowledge and attitudes influence their use of ICT in teaching. Research has shown that teachers' attitudes towards technology influence their acceptance of the usefulness of technology and its integration into teaching (Huang & Liaw, 2005). If teachers' attitudes are positive toward the use of educational technology then they can easily provide useful insight about the adoption and integration of ICT into teaching and learning processes.

On the school level, factors such as support, funding, training and facilities influence teachers' adoption and integration of technologies into their classrooms. Teachers' professional development is a key factor to successful integration of computers into classroom teaching. ICT-related training programs develop teachers' competences in computer use (Bauer & Kenton, 2005; Franklin, 2007; Wozney et al., 2006), influencing teachers' attitudes towards computers (Keengwe and Onchwari, 2008) and assisting teachers reorganize the task of technology and how new technology tools are significant in student learning.

On the technological level, for successful adoption and integration of ICT into teaching, teachers must perceive the technology as better than previous practice; consistent with their existing values, past experiences and needs; ease to use, can be experimented with on a limited basis before making a decision to adopt and finally the results of the innovation are visible to others. Many teachers are hesitant to change an existing program to something they only know through discussion and reading and not through observation. These three characteristics or attributes of teachers' adoption and integration of ICT into teaching provide information of factors supporting their use of technology as well as barriers to ICT integration. The key factor in the studies is teachers' attitudes toward technology or intentions to use technology in their classrooms. If teachers have negative attitudes toward technology, providing them with excellent ICT facilities may not influence them to use it in their teaching. Therefore, teachers need to be assured that technology can make their teaching interesting, easier, more fun for them and students, more motivating and more enjoyable.

Finally, factors (barriers) that discourage the use of ICT by teachers were also reviewed. These factors categorized are into teacher-level, school-level and system-level barriers. Teacher-level barriers include lack of teacher ICT skills; lack of teacher confidence; lack of pedagogical teacher training; lack of follow-up of new and lack of differentiated training programmes. The school-level barriers comprise absence of ICT infrastructure; old or poorly maintained hardware; lack of suitable educational software; limited access to ICT; limited project-related experience; lack of ICT mainstreaming into school's strategy and the system-level barriers include rigid structure of traditional education systems; traditional assessment; restrictive curricula and restricted organizational structure. Knowing the extent to which these barriers affect individuals and institutions may help in taking a decision on how to tackle them (Becta, 2004).

4. METHODOLOGY

This research adopted descriptive survey inform of a case Study. Moi University was chosen based on two reasons. First is that this university was founded on the premise of being a giant technological university in Kenya and South of Saharan Africa. This research therefore was a reassessment to find out if the university is still on its core and its initial track. Secondly the first survey about the availability and utilization of ICTs in learning and teaching of teachers was conducted by (Langat, 2009) and this research is a reassessment of that. The research instruments that were used are; Observation schedules, interviews, questionnaires and document analysis.

Graphic presentation of the findings:

This section investigated the basic ICT facilities that are required to place an institution into an appropriate stage to utilize, adopt and integrate them in teaching and learning process.

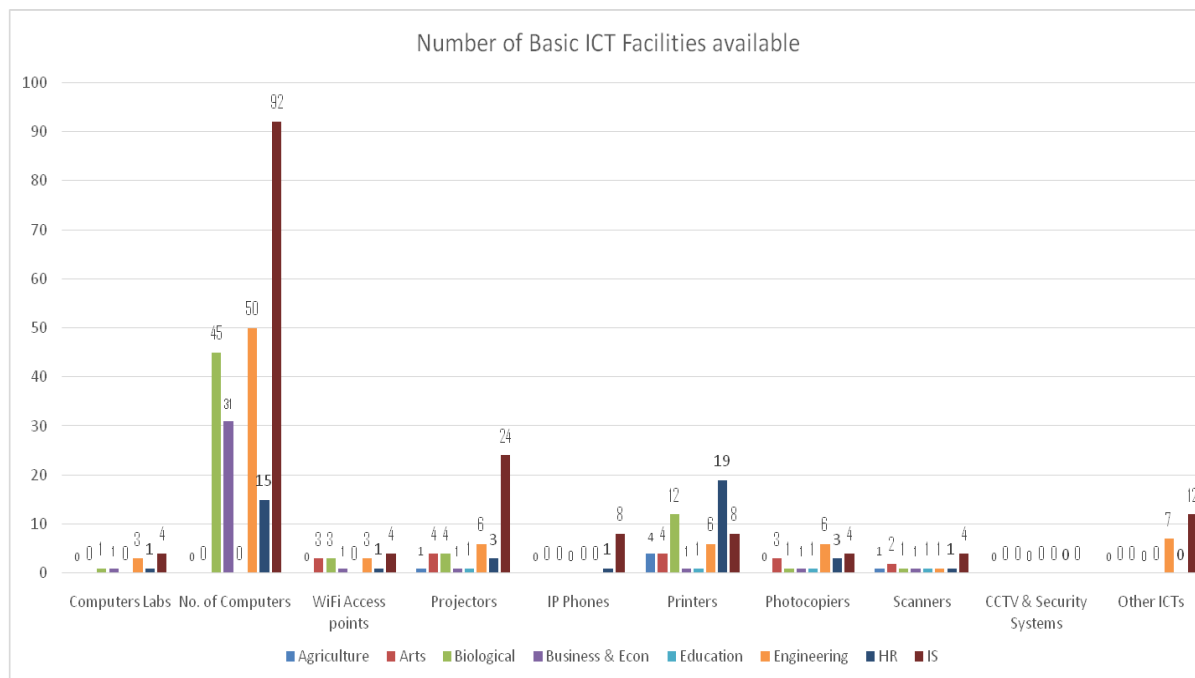


Figure 1: Basic ICT facilities.

Figure:1 above shows the basic ICT facilities available within each school, either for direct learning or to aid learning reflects on the school’s ICT preparedness. Herein they include; Computer Labs, Number of computers available in these labs,WiFi (Access points),Projectors,IP Phones, Printers ,Printers, copiers and scanners,CCTV and related technology for security system.

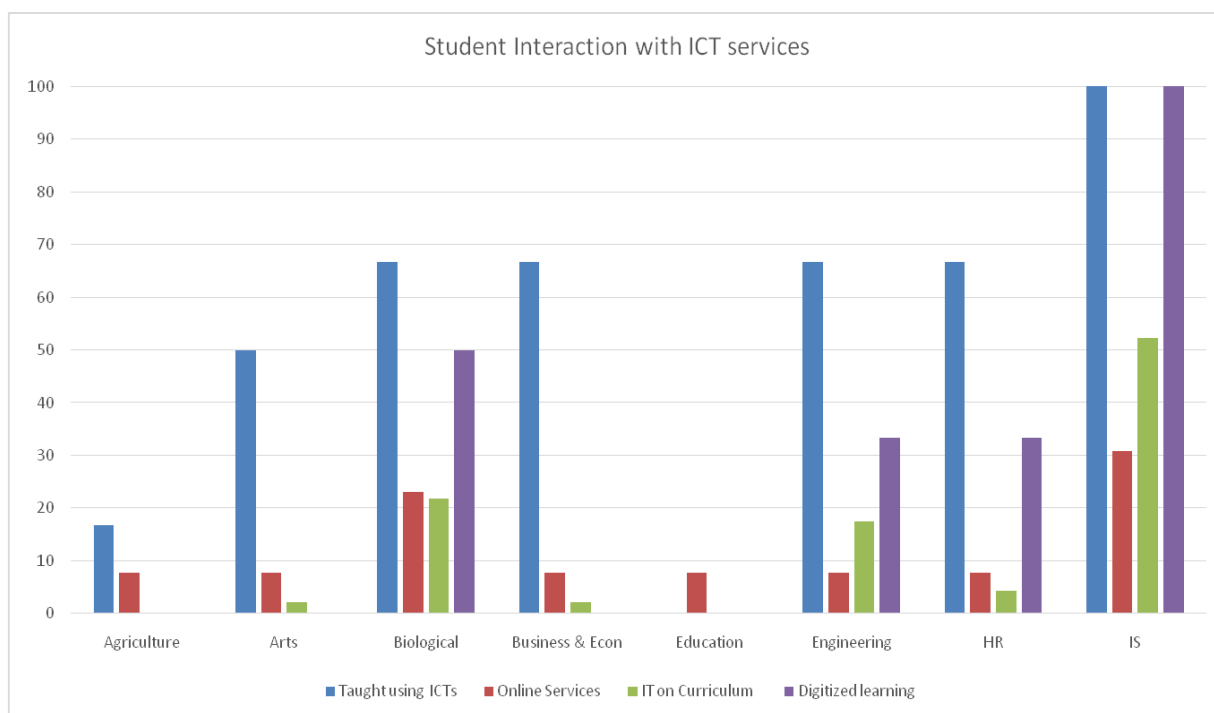


Figure 2: Student interaction with ICTs.

- Figure: 2 show students' interaction with ICTs in various schools. Taught using ICTs such as projector Power Point presentations, audio-visuals etc
- Access to online services offered by the school i.e. Timetables, Online Results, Accommodation booking, E-resources (books), notes & materials etc.
- All the different courses within the school possessing at least a curriculum that impacts IT knowledge on the student.
- Digitized learning/Online Supported; online access and submission of assignments, performing presentation, online classrooms, etc.

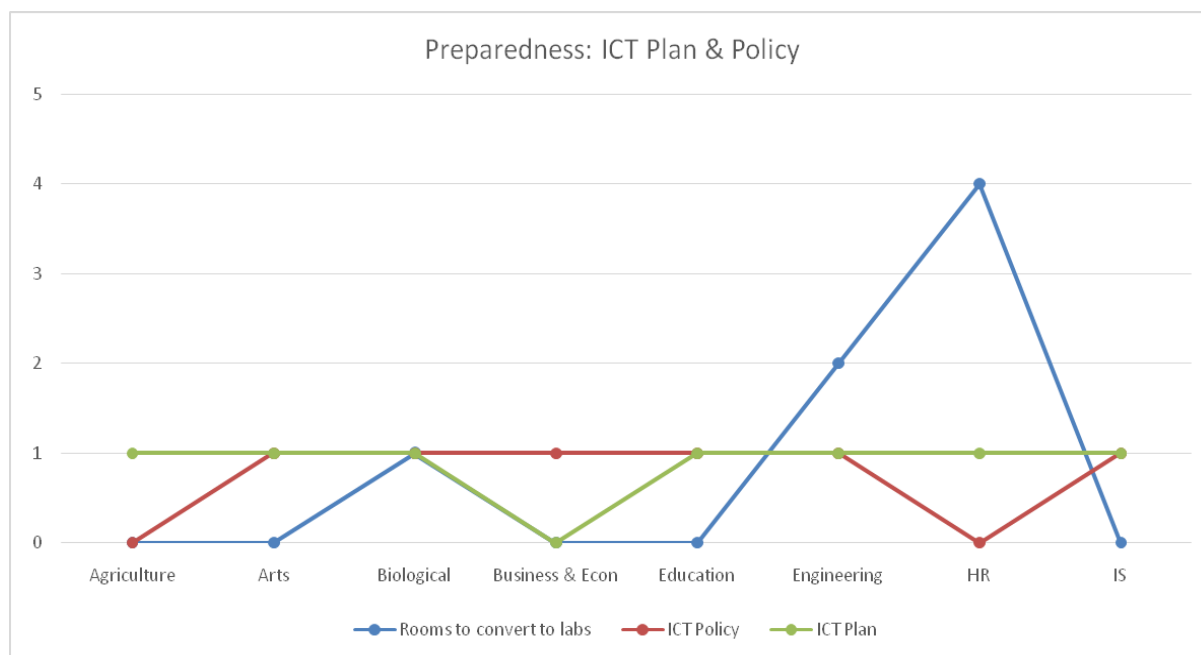


Figure 3: Preparedness in ICT plan and policy

Figure: 3 above entail preparedness through;

- POLICY that defines availability and usage of ICTs within the school
- PLAN that details the strategy for future ICT adoption

Also on the graph is; availability of room for expansion of ICT, conversion into computer labs or simply ICT centres.

5. DISCUSSIONS OF THE FINDINGS

The research was conducted in all the 7 schools of Moi university main campus through administration of questionnaires to 2 members of staff and three students in each school. This was to ensure congruence of the information collected from each particular school whilst eliminating errors from misrepresentation of tasks by just one responded.

Most of the schools were found to have some of the basic ICT facilities; i.e. Computer Labs and computers available in these labs have WiFi (Access points). They also Projectors, IP Phones Printers, copiers and scanners.

The school of Information sciences was found to be the most equipped with functional ICT equipment which both the staff and the students fully utilize in the learning process. With 4 Computer Labs (containing 92 functional computers), at least a fixed projector and a mounted screen in every lecture room among other items would only prove that indeed the school has moved a big step in adopting ICT. This could be attributed to the curriculum within the different courses pursued in the school.

Response from the students also showed that a lot of digitization and ICT is incorporated in their spheres of learning; access of notes and online materials, e-resources such as timetables, presentation/submission of assignments and also use of the equipment in learning.

The newly established School of Agriculture was found to have the least number of ICT facilities, with no computer labs, no internet access, no WIFI Access. Students from the school also responded not to have IT or related concept within any of their curriculum. No aspect of digitized learning was found; access of notes, submission of assignments or access of e-learning materials. This would possible be attributed to the fact that the school had just been newly established and was still on the roadmap to installing a lot of the aforementioned facilities.

The School of Biological & Physical Sciences emerged to be willing to spend the most in improving IT & Infrastructure in the next five years, ready to investing a whopping 20M, followed by the school of Engineering (10M) and the School of Human Resource Development (8M). Other schools were unable to quote a figure at the moment, though all of them had an ICT plan for the next 5 years.

The Schools of Human Resources, Engineering and Biological & Physical Sciences are the faculties that possessed rooms that could still be converted to Computer Labs or for general ICT expansion.

It was also observed that no school had substantially invested on ICT Security Machinery such as CCTV and related technology; but rather preferred the traditional human guard force for the existent ICTs and other available properties within each distinct school.

6. CONCLUSION

In conclusion so far the findings shows that most of the schools were found to have some of the basic ICT facilities; i.e. Computer Labs and computers available in these labs have WiFi (Access points). They also Projectors, IP Phones Printers, copiers and scanners. This according to the continuum model shifts the university from emerging approach to the applying level. It is also noticeable that the school of Information sciences was found to be the most equipped with functional ICT equipment which both the staff and the students fully utilize in the learning process and well integrated in their curriculum. So far this is the only school in the university that is the infusing approach and ready to get into the last stage of transformation and innovation. Other schools should also follow suit and give ICT priority right from implementation of required resources to full adoption, infusion and integration into their system.

7. RECOMMENDATIONS

All the schools should give priority to the implementation of ICT resources and prepare their learning classrooms to be ICT compliant.

Information communication technology (ICT) should not only be taught as a unit but also be fully infused/integrated into the entire curriculum.

The university should also make a policy to ensure that all the first year students should have their personal Laptop computers as a vital requirement during their admission.

The university management should prepare urgently in-service training program for all the lecturers to be trained on ICT skills so that they become prepared to implement ICT policy requirement by the university and also provide them with laptops.

Similar research should be conducted in other universities in Kenya in order to a comparative position and also enhance ICT implementation throughout the country.

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