Use of ICT in the Classroom: The Teacher and Learner

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Abstract

The use of ICT in classroom teaching and learning is critical for success of any education system. However, without proper implementation strategies and foundation in place for the use and application of ICT, the education agenda for any county or organization is bound to fail. This study sought to examine the current status of ICT in classroom teaching and learning, ICT integration in the classroom, educational Policy and Planning, teacher and learner attitudes, availability of hardware and learning e- resources, administrative support and internet connectivity with a view to making recommendation for improvement. Existing literature was reviewed and personal experiences used as educators and observations documented to guide in developing the research. Results showed that ICT covers a whole range of applications, techniques and systems and is key in effective facilitation of classroom teaching and learning, information dissemination and sharing and thus impacting the learner's life skills. It was further established that ICT plays an integral part in teaching-learning interactions through use of interactive digital whiteboards, smartphones and "flipped classroom" model that enables students to practically view live lessons. Training is recommended for teachers especially in the creative use and application of ICT tools in teaching, especially using the learner participatory approach.

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Introduction and Background

ICT in Teaching and Learning

The term Information and Communication Technology (ICT) was introduced in the early 1990's to replace Information Technology (IT) in recognition of the communicating abilities and facilities offered by the computer. However, while most people have adopted the term ICT, people in higher education use the term Communication and Information Technology (CIT) to refer to the same concept.

ICT covers a whole range of applications, techniques and systems (Clarke, 2006). Lallana and Margaret (2003) argue that ICT refers to abroad field encompassing computers, communications equipment and services associated with them. ICT is not just considered as applications and systems, but also as a skill for life. In this sense, it is regarded in line with literacy and numeracy as a fundamental skill which every individual needs so as to live confidently, effectively and independently in a modern society (Clarke, 2006). Use of technological skills in learning and teaching have been proven important during COVID – 19 pandemic due to lockdowns and cessation of movement forcing learners and teachers to learn remotely (UNESCO, 2021). Both teachers and learners were in high need of basic ICT tools and Internet connectivity for learning to continue remotely.

ICT is as a key skill, underlies learning in different subject areas, while it is developed through each subject (Tanner & Jones, 2003; Kennewell, 2004). This identification of ICT as a skill for life formed the basis of its introduction in the institution curriculum in the developed nations. ICT has three positions in the curriculum, namely: learning about ICT, learning with ICT and learning through ICT. Learning about ICT refers to ICT concept as a subject of learning in the institution curriculum, while learning with ICT is concerned with the use of ICT as a medium to facilitate instruction. While supporting the same view, Pelgrun and Law (2003) maintain that learning through ICT refers to the integration of ICT as an essential tool into course /curriculum. It implies that ICT can be learnt as any other subject in the curriculum but can also be integrated in the learning process so that learning takes place through the learners' interaction with the facilities.

Education has traditionally been a process of impartation of knowledge, skills, attitudes, values and other dispositions in order to produce a better and productive individual. However, modern technologies expect education to go beyond traditional impartation to enabling learners to engage in a life-long acquisition of knowledge by their own efforts especially through the use of ICT. In ancient Greece, Socrates argued that education is a slow

and skilful process of extracting the latent potentialities which are already within a learner hence it is a life-long process that begins at birth and ends with death (Wosyanju, 2009; Teklemariam & Nam, 2011; Teachers Mind, 2012). Integration of ICT refers to seamless incorporation of ICTs to support and enhance the attainment of curriculum objectives, to enhance the appropriate competencies including skills, knowledge, attitudes and values and to manage education effectively and efficiently at all levels (Republic of Kenya, 2012b). Institutionalization of technology represents the degree to which ICT technology becomes a routine and pervasive commodity within the institution so that ICT uses become the acceptable ways of doing things.

Using and integrating ICT in institutional management, teaching and learning helps to shift learning from the traditional approaches to modern including online learning. For instance, knowledge is transferred from teachers and textbooks to learners with little space and more time is given to critical analysis of issues by learners (Republic of Kenya, 2012a). In addition, ICT is a key tool of modern technology used in the training and acquisition of various skills both in education and in other areas of focus by professionals. Thus ICT in education is considered as a discipline, resource and key skill. Within these broad areas, ICT offers enormous benefits to society based on the fact that ICT education in education is not only imparting knowledge and skills for the information age, but also in boosting the economic and political status of the country. Besides harnessing the potential of ICT, nations can greatly expanding economic growth, dramatically improved human welfare and stronger forms of democratic governance (Chandrasekhar, Kumar & Kamik, 2004). It is in this regard and in view of education objectives of providing the learners with opportunities to acquire necessary knowledge, skills and attitudes for the development of the self and the nation, build a foundation for technological and industrial development, that makes it necessary to integrate ICT in education.

Study Objectives

This study sought to stablish the current status of ICT in classroom teaching and learning, the principles of ICT integration in the classroom, educational Policy and Planning, and determine teacher and learner attitudes, availability of hardware, electronic learning resources, administrative support and internet connectivity with a view to making recommendation for improvement.

Methodology

The study reviewed existing literature and used personal experiences of educators.

ICT Use in Classroom

It is necessary to develop a thorough rationale before beginning to use computers in classrooms. This would be of little significance providing computers in institutions unless a valid rationale has been established. With the increasing availability of computer hardware, it is important that teachers do not become engrossed in the machine, but focus on their primary role as educators. Since the 1960's the computer has been heralded by some as the solution to many problems in education. According to Lee (2006), many early computer scientists saw the possibility of the computer replacing teachers in institutions. However, this has not been the case in the mainstream institutions (Collis, 1989). There are three main rationales for ICT in institutions, thus the organizational productivity of the Institution, technological literacy and support for student learning. Dest (2002) presupposes the need for ICT competent students and for ICT rich environments that enhance students' learning across the curriculum.

Historically, technology has been developed to solve problems, improve living standards and increase productivity. If the most appropriate educational technology is selected by teachers, then students learning should be optimized which through increasing the value of the outcomes. However, the cost of technology may be a factor to consider. ICTs are be relatively expensive to procure, install, maintain and support users and this should be compared with the outcomes (Lankshear & Synder, 2000). Besides productivity, technology is used because it solves a major problem in teaching or learning (Lankshear & Synder, 2000). This could complement the aspect of productivity, for if a part of the curriculum is not completed due to lack of technology, then the associated value of the outcomes is zero and therefore, the productivity is zero.

A nationwide survey of teachers commissioned by Josten Learning Cooperation (1997) indicated that the computer revolution has had a tremendous impact in the classroom. The emphasis was on student access to information outside the classroom and improved student motivation, not on specific academic achievement. The study found that fewer than half of the teachers used computers for instructional purposes, rather they used word processing, spreadsheets or graphics for personal productivity only. Differing priorities showed that teachers would rather use additional funding to increase the number of computers in classrooms while principals felt that teacher training would improve effectiveness of computer use in learning. Other surveys (Bosch, 1993; Niess, 1991; Trotter, 1997), while reporting strong computer usage by teachers, pointed to lack of integrated use with the

curriculum. In many instances, it has been a case of fitting the curriculum to the computer rather than the computer to the curriculum.

Working in an appropriately designed ICT rich environment has the potential of producing a variety of positive outcomes, improved patterns of social interaction, and changes in teaching styles, more effective teaching, increased student and teacher motivation. Achieving this potential is a challenge and requires the correct vision of ICT and its integration (Tiene & Luft, 2001). Education Week magazine (1999) examined the state of ICT in public education in the United States and reported that; (i) 43% of the respondents in a survey felt that introduction of computers into public institutions was not happening fast enough, (ii) that despite the lack of research evidence, 74% of the public and 93% of educators agreed that computers had indeed improved the quality of education, teaching and learning (Trotter, 1997, p. 8) (iii) that placing computers and software in the classrooms is not enough, rather, discovering whether ICT "works" is not the point and that the real issue is when and under what circumstances. Like any other tool, teachers have to come up with a strategy or pedagogy to make it work (Viadero, 1997, p. 16), (iv) that wise use of technology takes adequate training, time planning, support and teacher ownership (Viadero, 1997, p.16) and that (v) money spent on technology is wasted without an equal effort to help teachers with its use and integration into the curriculum (Zehr, 1997, p. 24). Thus despite the general feeling that the computer revolution of the last decade has had a major impact in institutions, the nature of this impact seems to be limited to access and information retrieval rather than improved teaching methods or revitalized institution and classroom structures (Hativa & Lesgold, 1996).

According to Pelgrum, 2001 challenges have been acknowledged by a number of scholars with;

i. Access to hardware and software as well as funding.
ii. Time for planning, personal exploration, online access and skill development
iii. Technical and administrative support and resources.
iv. Resistance, passivity, institution cultures and traditions of teaching
v. Vision and leadership
vi. Support for integration of technologies into instruction and the curriculum

Ertmer (1999) grouped these challenges into two categories: first order challenges or barriers extrinsic to teachers (access, time, support, resources, training) and second order challenges intrinsic to teachers (attitudes, beliefs, practices, resistance). She asserted that even if every first order challenges/barrier were removed, teachers would not automatically use

ICT/technology and in fact, rather than being eliminated completely, such barriers will continue to ebb and flow throughout the evolutionary integration process.

Principles of ICT Integration in the Classroom

Integration does not mean placement of computers or hardware in classrooms. If computers are merely add-on activities or fancy work sheets, where is the value? (Hadley & Sheingold, 1993). ICTs must be pedagogically sound. They must go beyond information retrieval to problem solving; allow new instructional and learning experiences not possible without them; promote deep processing of ideas; increase student interaction with subject matter; promote teacher and student enthusiasm for teaching and learning; and free up time for quality classroom interaction.

Wager (1992) argued that the educational technology that can make the biggest difference to institutions of learning and students is not the hardware, but the process of designing effective instruction which incorporates computer technology and other media appropriately. Integrating technology is not about technology, it is primarily about content and effective instructional practices. ICTs involve the tools with which we deliver content and implement practices in better ways. Integration is defined not by the amount or the type of ICTs used, but by how and why it is used. Successful technology adoption and integration requires concerted focus on the mission of improving education for all students. It grows from the mission. Bernauer (1995) captured a significant insight when he stated that it is not ICT as such that has resulted in improved student outcomes, but rather how the technology was used and integrated into instructional processes.

In addition, Munoz (1993) described herself as a technophile, emphasized the prudent, ethical use of ICT and warned us to resist the seductive force of technology to replace rather than enhance. Fullan (2000), in a review of educational reform, reminds us that since technology is ubiquitous, the issue is not whether, but how we contend with it. He stressed that as ICTs become more powerful, good teachers become more indispensable.

Lewin (1951), the author of force field analysis theory, illustrates the dynamics at work in the change process. This Movement from the present level of performance to a desired level is facilitated by driving or encouraging forces, while at the same time, it is hindered by restraining (or resisting, discouraging) forces. The present situation usually represents a state of equilibrium or balance between these driving and restraining forces.

The Driving forces for technology integration might include the power and potential of new developments, rapid availability, creativity, internet access, ease of communication, or the promise of impact on learning. Restraining forces might include barriers and constraints such as technical support, teacher expertise, and time for planning or pedagogical applications. ICT does, indeed, hold a remarkable promise for changing the quality of teaching and learning in our institutions. It is indeed a catalyst for transformation, but this does not mean that we merely need more computers in our classrooms. We spent resources on installing equipment, which soon begin to gather dust, because we neglected the process components –learning, teaching practices and curricula. Thus, ICTs are valuable resources, but only when used in a systematic process for developing human competence (Earle, 1992).

Teacher Use of ICTs

According to Fullan (2000), integration includes a sense of completeness or wholeness and incorporates the need to overcome artificial separations by bringing together all essential elements in teaching and learning process. Change starts with individual teacher, who, upon catching the vision, is willing to take risks, experience confrontations or encounters in rethinking, teaching, and learning and to model for and be a mentor to peers. It involves preparation of the teacher (building relationships of trust, helping teachers feel and recognize the power of teaching with technology, personalizing, training, and finding out teacher needs, interests and concerns), commitment by the teacher, following up on that commitment by the support team and resolving teacher concerns arising during the change process. Teachers move through at least three levels in the change process: confidence, competence, and creativity. It is the gradual nature of the process as they progress from learner to adopter to leader.

Kafu (1976) noted that teachers tend to lag behind in adaptation and adoption of new technologies that they are nervous and unwilling to adopt these innovations and hence find themselves unprepared to meet the new demands of the accelerating educational technology that confront them including introduction of computers. Tinio (2003) argued that although valuable lessons may be learned from best practices around the world, there is no one formula for determining the optimal level of ICT integration in the educational system. Significant challenges that the policymakers and planners, educators, education administrators and other stakeholders need to consider include educational policy and planning, infrastructure-hardware availability, software and content development, capacity building/training, administrative support, and teacher attitude.

Makewa (2002) stated that teachers in institutions encounter a number of problems as they attempt to implement computer use in their institutions. These problems include insufficient number of software, lack of adequate computer knowledge and maintenance competence, training opportunities, lack of modern computers, and inadequate funds for computer implementation.

Educational Policy and Planning

Tinio (2003) points out that attempts to enhance and reform education through ICTs require clear and specific objectives, guidelines and time-bound targets, mobilization of required resources and political commitment at all levels to see the initiative through. Some of the essential elements of planning for ICT are listed as:

i. A rigorous analysis of the present state of the educational system. ICT-based interventions must take into account current institutional practices and arrangements. Specifically, drivers and barriers to ICT use need to be identified, including those related to curriculum and pedagogy, infrastructure, capacity building, language and content, and financing.
ii. Specification of educational goals at different education and training levels as well as the different modalities of the use of ICTs that can best be employed in pursuit of these goals. This requires of the policy maker an understanding of the potential of different ICTs when applied in different contexts for different purposes and an awareness of priority education needs and financial and human resource capacity and constraints within the country or locality as well as best practices around the world and how these practices can be adapted for specific country requirements.
iii. The identification of stakeholders and harmonizing efforts across different interest groups.
iv. The piloting of the chosen ICT-based model. Even the best designed models or those that have already been proven to work in other contexts need to be tested on small scale. Such pilots are essential to identify and correct, potential glitches in instructional design and implementability.
v. The specification of existing sources of financing and the development of strategies for generating financial resources to support ICT use over the long term.

Teachers' and Students' Attitudes

Rogers (1995) asserted that attitude determines whether a person is willing to try a new innovation or not. With the explosion of information in all areas of our lives, the growing

need for a more competent workforce increases the need for the integration of ICT in classrooms.

In large part, then, the responsibility for preparing highly qualified workers who are up to the challenges of a global economy rests on teachers. In order for teachers to integrate technology successfully in their classrooms, it is crucial that they cultivate and maintain positive attitudes toward technology and attain computer skills (Hignite & Echternacht, 1992). Some teachers do not believe that ICT's are relevant to either student improvement or to their professional development. As a result, there is a slower shift in teachers' attitude towards ICTs than planners had expected and hence student attitude is affected.

Hardware and Learning Resources

According to Tinio (2003), a country's educational technology infrastructure sits on top of its national telecommunications and information infrastructure. Before any ICT- based programme is launched, educators must carefully consider whether or not;

i. There appropriate rooms or buildings available to house technology. In countries where there are many old buildings, extensive retrofitting to ensure proper electrical wiring, heating/cooling and ventilation, and safety and security would be needed.
ii. Electricity and telephone are available. In developing countries large areas are still without reliable electricity and the nearest telephones are miles away. Experience in some countries in Africa point to wireless technology (such as VSAT or very small aperture terminal) as possible levers for leapfrogging. Although this is currently an extremely costly approach.

It is cheaper and easier to introduce a form of technology into education and keep it working where education is riding on the back of large-scale developments by governments or private sector. Television works for education when it follows rather than precedes television for entertainment. Computers in institutions can be maintained once commercial and private use has expanded to the point where there is an established service industry. Thus, it is not always necessary to have one computer per student, but they need sustained access to appropriate computer systems. The hardware requirements of the computer system will depend on the type of software required.

Capacity Building

Various competencies must be developed through the educational system for ICT integration to be successful. According to Tinio (2003), teacher professional development should have

five foci: skills with particular applications, integration into existing curricula, curricular changes related to the use of ICT, changes in teacher role, and underpinning educational theories. Ideally, these should be addressed in pre-service teacher training and built on an enhanced in-service. In some countries, teaching accreditation requirements include training in ICT use. ICTs are swiftly evolving and even the most ICT fluent teachers need to continuously upgrade their skills and keep abreast of the latest developments and best practices. Most teachers' professional development in ICT is heavy on "teaching the tools" and light on "using the tools to teach."

Administration Support

According to Hope (1997), leadership plays a key role in ICT integration in education. Many teacher or student-initiated ICT projects have been undermined by lack of support from the administrators. For ICT integration programs to be effective and sustainable, administrators themselves must be competent in the use of technology and must have a broad understanding of the technical, curricular, administrative, financial and social dimensions of ICT use in education. Thus, successful implementation of ICT in education would to an extend depend on the principals or education managers. ICT in education is a target oriented innovation which is very demanding in terms of financial, material and human resources. The huge financial involvement makes it necessary for the principal to understand clearly the essence of ICT in education, its benefits to human beings especially in education sector and how ICT in education can be developed and implemented. The Scottish Executive (2000) presents some ideas which a principal who is in the process of starting ICT in education should consider. These include;

i. Finding out where the institution is now, what is the current provision in the curriculum, resources for training and other needs?
ii. Finding out where the institution needs to be?
iii. Deciding how the institution will get there.
iv. Creating an ICT section in the institution development plan.
v. Conducting a staff training ICT needs assessment.
vi. Reviewing the curriculum.
vii. Considering approaches to teaching and structuring of tasks.
viii. Considering how ICT can impact on a range of learning approaches.
ix. Considering the ICT present learning environment and what is needed to deliver the curriculum.
x. Determining how assessment, recording and reporting for ICT is done.

xi. Considering developing a policy statement for ICT across the institution.
xii. Determining how monitoring and evaluation of ICT performance is carried out.

The Scottish executive also presents indices of ICT successful implementation as a guide to principals. According to the Scottish Executive (2000) ICT in teaching and learning is successful where pupils are:

i. Motivated, challenged and required to think for themselves.
ii. Encouraged to be independent and confident users of technology.
iii. Set tasks, encourage cooperation and collaboration, solve given problems and more responsive in the context of support for learning activities.

These indices of successful ICT in education should guide every principal during the development and implementation phases of ICT in education in his/her institution. At the planning stage, they guide selection of learning content and resources, while at the implementation stage, they guide the process of evaluation. One underpinning requirement is that every institution principal should endeavor to be competent in the use of technology. Tinio (2003) this observed that for effective and sustainable ICT in education, the leader or administrator must have a broad understanding of the technical, curricular, administrative, financial and social dimensions in education.

Technical Support

Tinio (2003) continued to argue that technical support whether provided by in-institution staff or external service providers, or both, technical support specialists are essential to the continued viability of ICT use in a given institution. Thus, while the technical support requirements of an institution depend ultimately on what and how technologies deployed and used, general competences that are required would be in the installation, operation and maintenance of technical equipment (including software), network administration and network security. Without on-site technical support, much time and money may be lost due to technical problems.

Content and Software Availability and Internet Connectivity

Tinio (2003) continued to argue that content development is a critical area that is too often overlooked. The bulk of existing ICT based educational material is likely to be in English or of little relevance to education in developing countries, Kenya included. There is therefore, need to develop original educational content e.g. radio programs, interactive multimedia learning materials on CD-ROM or DVD and web based courses. An estimated 80% of online content is in English hence a large proportion of the educational software produced in the

world market is in English. For developing countries in the Asia-Pacific countries where English language proficiency is not high, especially outside metropolitan areas, this represents a serious barrier to maximizing the educational benefits of the World Wide Web-WWW. Thus, even in countries where English is a second language (such as Kenya, Singapore, Malaysia, the Philippines, and India) it is necessary that teaching and learning materials that match national curriculum requirements and have locally meaningful content, preferably in the local languages, be developed. This would ensure that the World Wide Web is a genuinely multicultural space and that people from different cultures have an equal stake and voice in the global communities of learning and practice online.

Conclusion and Recommendation

Use of ICT in teaching and learning is critical for success of any education system. Its impact on education is encouraging because students are taught practical IT skill which can be used in working life as well since it is a life skill. ICT allows students to monitor and manage their own learning, think critically and creatively, solve simulated real-world problems, work collaboratively, engage in ethical decision-making, and adopt a global perspective towards issues and ideas, allowing the teacher to produce and modify information resources quickly and easily for access and use by learners. It allows access to a wide range of information in various formats, and interactive whiteboards (IWBs) have become essential tools in the classroom enabling learners to engage in a life-long acquisition of knowledge using their own efforts and subsequently recognizing their readiness, attitudes, motivation, barriers, and learning styles. They also significantly enhance learner human and social capabilities and have a positive role on their well-being. ICT further necessitates greater communication, resource sharing, and improved practice so that the education agenda is owned by helping every individual in the system improve teaching and learning. It is a time of great possibility and progress for the use of technology to support learning. However, to maximize on the use of ICT in classroom, there is need to establish a starting point where each students' ICT learning and embed in key learning areas such as literacy and numeracy is established; planning for progression in ICT learning progression in the Learning Continuum of the curriculum, and employing evidence based ICT teaching strategies that support ICT learning alongside subject learning.

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