The Roles Of Information Communication Technologies In Education With Emphasis To The Use Of Computer And Internet

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Abstract: The study mainly focused on the roles of Information Communication Technologies (ICTs) in education. Information communication technologies, currently have great influence on every phase of human life. They play prominent roles in educational sectors, work places, business areas and entertainments. Besides, virtually everybody sees ICTs as substance for change in all working conditions, teaching and learning approaches, handling and exchange of information, scientific research and in retrieving information. Consequently, this study highlights the roles of ICTs, the promises, limitations and the key challenges of incorporation to education systems. The study attempts in answering the following questions: (1) What are the benefits of ICTs in education? (2) What are the existing promises of ICTs use in education systems? (3) What are the limitations and key challenges of ICTs incorporation to education systems? The study concludes that regardless of all the limitations, ICTs benefit education systems to provide quality education in relationship with constructivism, which is a modern-day model of learning; computer and internet are especially useful to enhance students' engagement in learning and positively impact students' performance and achievement. The study equally recommends the mainstreaming of ICTs utilization (particularly the computer and internet) in education systems at all levels, for they benefit curriculum implementations and enhance students' learning.

I. INTRODUCTION

Information communication technologies make vigorous changes in the society. They have great impact on all aspects of life (Uwazurike, 2008). The impacts are felt more and more at schools because, ICTs provide both students and teachers with more opportunities in adapting learning and teaching to individual needs, which society forces school to aptly respond to. Tinio (2012) states the potentials of ICTs in increasing access and improving relevance and quality of education in developing countries. He goes further and states that ICTs greatly aid the attainment and immersion of knowledge, giving developing countries unparalleled opportunities to enhance educational systems, improve policy makings and implementations, and enlarge the range of opportunities for business enterprise and the poor. According to him, one of the greatest hardships endured by many people who live in the poorest countries, in their sense of isolation, ICTs can open access to knowledge in ways unimaginable.

Watson (2010) posits that ICTs have revolutionized the way people work today and are now transforming education systems. As a result, if schools train children in yesterday's skills and technologies, they may not be active and fit in tomorrow's world of technological changes. This is enough reason for ICTs to win global acknowledgement and attention. For instance, ICTs are reliable tools in facilitating the attainment of one of the Millennium Development Goals (MDGs), which is achievement of universal primary education by the year 2020. ICTs according to Ogbuatu (2011), provide greater opportunities for students and teachers to adjust learning and teaching to individual needs, society is forcing schools to give appropriate response to this technical development.

Though ICTs play outstanding roles in representing equalization strategy for developing countries, the reality of the digital divide-the gap between those who have access to and control technology and those who do not, make a great difference in the use of ICTs. This implies that the introduction and incorporation of ICTs at different levels and

various types of education is the most challenging undertaking. Failure to meet the challenges will mean a further widening of the knowledge gap and deepening of existing economic and social inequalities among the developed and the developing countries. Therefore, the purpose of this study is to discuss the benefits of ICTs use in education in the improvement of students' learning and experiences of some countries in order to encourage policy makers, school administrators, and teachers, pay the required attention to incorporate this technology in their education systems. In so doing, it highlights the benefits of ICTs in education, existing promises, and the limitations and challenges of incorporation to education systems.

II. THE BENEFITS OF ICS IN EDUCATION

The uses of ICTs are making tremendous differences in the learning of students' and teachers' teaching approaches. Schools in the Western World invested a lot for ICTs infrastructures over the last 25 years, and students use computers more often and for a much larger range of applications (Volman, 2015). Several studies reveal that students using ICTs facilities mostly show higher learning gains than those who do not use. For instance, according to Kulik (2014) students who use computer tutorials in mathematics, natural science, and social science score significantly higher on tests in those subjects. Students who use simulation software in science also score higher. He further says that primary school pupils who use tutorial software in reading score higher on reading scores. According to Ikegbusi and Iheanacho (2016) students who are well grounded in the use of ICTs will be self-employed, thereby reducing the number of job seekers in the society. Very young children who used computers to write their own stories score significantly higher on measures of reading skills. More so, students who used word processors or use computers for writing score higher on measures of writing skills. Administrators who provide ICTs to their teachers and students will be more effective in their administration. The students as well as the teachers will be more focused and connected in the school and class, thereby making teaching and learning more easier (Ikegbusi, Eziamka & Onwuasoanya, 2016).

Additionally, the use of ICTs in education also shifts the learning approaches. As put by Bransford, Brown and Cocking (2014) there is a common belief that the use of ICTs in education contributes to a more constructivist learning and an increase in activity and greater responsibility of students. This limits the role of teachers to supporting, coaching and advising students, rather than merely transmitting knowledge. The gradual progress in using computers changes from learning about computer, to learning computers, and finally to learning with computers (Volman, 2015). With respect to introducing ICT technologies in schools, Olson (2000) advises to explore the following questions as bases for in-service teacher education. They are:
- ✓ How can the theoretical ideas tested in practice?
- ✓ What does practice say back to this theoretical ideas?
- ✓ How is useful negative feedbacks obtained?

- ✓ What might be substantive talking points about the new processes?
- ✓ What is practical form a classroom perspective?
- ✓ What does talking about the new say about the nature of existing technology, is it adequate?
- ✓ What scaffold needs for the next stage?

On the other hand, teachers' reluctance to adopt innovations need to be seen in the context of existing technology and commitments. Fullen (2010), states that change or improvement can happen at schools if teachers understand themselves and are understood by others. For instance, many teachers are currently not in a position to make inferred judgements on ICTs to support their teaching goals. Clearly, a number of factors still make using ICTs in the school curriculum problematic (Watson, 2010). On this note, the influence of ICTs do not bring revolutionary changes at schools. For instance, the National ICTs survey in the Netherlands show that most primary school pupils use computers less than once a week and there are still many secondary school teachers who do not use ICTs at all (Volman, 2015). In the same vein, Okafor (2014) states that virtually, all public secondary and primary school children in Nigerian schools do not make use of computers in schools. Teachers also do not use ICTs at all in their teaching and learning. The computers are supplied in schools, but not well utilized. Most often, they use computers for drill and practice and word processing.

In recent years however, there has been a growing interest to know how computers and internet can be best utilized to improve effectiveness and efficiency of education at all levels and in both formal and non-formal settings. As there is a shift of theories explaining learning processes, ICTs become handmaiden for learning activities. Voogt's (2013) description on the major roles, distinguishes ICTs as an object for study, an aspect of a discipline or a profession, and a medium of instruction. ICTs fit to realize and implement the emerging pedagogy of constructivism. He further differentiates between traditional learning setting and constructivist approaches. The former considers learning as transmission of knowledge to students, which is the sole responsibility of teachers. On the other hand, the constructivist approach considers learning as authentic and learner centred. ICTs, the computer for example is a great help in the constructivist approach, where one can design computer-generated and individualize learning environments to students.

ICTs are applying impacts on pedagogical approaches in the classrooms. Their contributions to changes in teaching practices, school innovations, and community services are significant. Kozma (2005) suggests three significant concerns of consideration regarding ICTs impact on education. Firstly, students' outcomes such as higher scores in school subjects or the learning of entirely new skills needed for a developing economy. Secondly, teacher and classroom outcomes such as development of teachers' technology skills and knowledge of new pedagogic approaches as well as improved attitudes toward teaching should be considered. Finally, one has to consider other outcomes such as increased innovativeness in schools and access of community members to adult education and literacy.

Tinio (2012) lists the pedagogic aspects in terms of implication for ICTs use as follows: Active learning, Collaborative learning, Creative learning, Integrative learning and Evaluative learning.

ACTIVE LEARNING: ICTs enhance-learning, mobilize tools for examination, calculation and analysis of information in order to provide a platform for students' inquiry, analysis and construction of new information. The learners therefore, learn as they do, and whenever there is appropriate work on real life problems, ICTs make the learning less abstract and more relevant to their life situations. In contrast to rote learning, that is the feature of traditional pedagogy, ICTs enhance-learning can also be 'just in time' learning, that the learners choose what to learn when they need.

COLLABORATIVE LEARNING: ICTs-support learning encourages interaction and cooperation among students, teachers, and experts not minding of where they are. Apart from modelling real world interactions, ICTs-support learning provides opportunity to work with students from different cultures, thereby helping to enhance learners teaming and communication skills as well as their global awareness. It duplicates learning done throughout the learner's life time by expanding the learning pace to include not just peers but also mentors and experts from different fields.

CREATIVE LEARNING: ICTs-support learning promotes the manipulation of existing information and the creation of real-world products rather than the duplication of received information.

INTEGRATIVE LEARNING: ICTs-enhance learning promotes a thematic integrative approach to teaching and learning. This approach eliminates the artificial separation between the different disciplines and between theory and practice, which is the characteristic of the traditional approach.

EVALUATIVE LEARNING: ICT-enhance learning is student-directed and diagnostic. Unlike fixed, text or printed-based education. ICTs-enhance learning recognises the presence of different learning pathways to explore and discover, rather than merely listen and remember.

The above discussions clearly expound the role of ICTs in expediting and facilitating the pedagogy of schools in the information society. Watson (2010), assets that ICTs are becoming more fitting to realize and implement the emerging pedagogy of constructivism. However, Voogt (2013), shows a major obstacle for ICTs integration in education and that is the difficulty of integrating computers and internet into classroom practices. Teachers' lack of competence and enthusiasm to use computers in the instructional processes also contribute to the difficulty. Consequently, in order to improve and make optimal use of ICTs, changes in the pedagogic approaches and classroom strategies as well as integrating ICTs in teacher training and staff development practices followed by teacher motivation schemes is imperative.

Generally, Voogt (2013) describes the following functions of ICTs in education.

✓ ICTs as 'assisting tool'. ICTs are used as a tool, for example while making assignments, collecting data and documentation, communicating, and conducting research. Typically, ICTs are used self-reliantly from the subject matter.

✓ ICTs as object. This refers to learning about ICTs. Mostly organised in a specific course. What is being learned depends on the type of education and the level of the students? Education prepares students for the use of ICTs in education, future occupation, and social life.

✓ ICTs as medium for teaching and learning. This refers to ICTs as tools for teaching and learning itself, the medium through which teachers can teach and learners can learn too. It comes in many different forms, such as drill and practice exercises, in simulations and educational networks.

✓ ICTs as tools for organisation and management in schools.

III. EXAMPLES OF ICT USE IN EDUCATION SYSTEMS OF DEVELOPED COUNTRIES

Most of the developed countries have applied ICTs in the 1980s to the level of K-12 education for a variety of reasons, which are still binding. Some of the reasons as highlighted by Volman (2015) are as follows:

A NEW SOCIETY REQUIRES NEW SKILLS

ICTs increasingly pervade every aspect of life (work, leisure, learning, and health). Because ICTs are fantastic tools for information processing, the new generation needs to become experienced in their use, should acquire necessary skills, and therefore must have access to computers and networks while at school (Kok, 2007). Schools are information and knowledge holding institutions, therefore, ICTs should be fundamental information management tool at all levels of an educational system from classroom to ministries.

A QUEST FOR QUALITY LEARNING

Schools should extremely revise present teaching practices and resources to create active learning atmospheres and enhance life-long learning skills and habits in their students. ICTs are multipurpose and influential tools that can help in this purpose and should therefore be present in every classroom, library and teacher room. Nonetheless, so far ICTs have not provided any large-scale breakthrough in learning improvements even though there are still promises with great abilities.

Developed nations are using ICTs in their education systems and the reverse is the case of the developing nations (Okafor, 2014). For instance, in the United Kingdom, 'rising of standards' of teaching and learning has become entwined with the use of ICTs (Watson, 2010). As the UK Minister for Education and Employment states, using digital technology for improving the delivery of education has tremendous potential to raise standards and increase employability. To realize this, numbers of computers in schools increase time after time. In 1980, an initiative placed one computer in every secondary school: two years later there were 16. In 1990, the average number of pupils per computer in secondary schools was 18; by 1998, it was eight. The Minister refers to this

according to Watson (2010), as '' my schools into an information age.'' According to Kulik (2014), the use of computers at an early age helps students learn ICTs skills in the education process.

In Nigeria, teacher education institutions are still faced with the challenges of preparing a new generation of teachers to effectively use the new learning tools as provided by ICTs in their teaching practice (Uwazurike, 2008). For many teacher education programmes, this daunting task requires the acquisition of new resources, expertise and careful planning which may include; having the knowledge and impact of teaching on global society and the implication for teacher education and also the extensive knowledge that has been generated about how people learn and what this means for creating more effective and engaging students'- centred learning environments.

IV. IMPLICATIONS OF ICTS-ENHANCED EDUCATION FOR POLICY AND PLANNING

There is a common belief that ICTs have outstanding contributions to changes in teaching practices, school change and innovations, and community services. Thus, policy makers and project leaders should think in terms of input factors that can work together to observe the right impact of ICTs in education. Matching the introduction of computers with national policies and programs related to changes in curriculum, pedagogy, assessment, and teacher training and development is more likely to result in greater learning of students and other out comes (Uwazurike, 2008). OECD's international survey (2002) of upper secondary schools in 17 countries reveals computer availability for students; use of ICTs by teachers; ICTs activities as a part of students' assignment; the role of ICTs teaching and learning; staff development; cooperation with other schools and organizations; and obstacle to using ICTs in schools and found great variations among the countries with respect to the mentioned variables.

The need for linking ICT to education policies requires recognition. In reflecting the importance of technologies, education policy should focus in the following major points (UNDP, 2004):

✓ Education policies have to reflect alternate and new teaching paradigms that ICTs can offer in terms of providing a more effective, relevant, and flexible mode of learning for the underprivileged and the general masses
✓ Policies must take into account the retraining of teachers incorporating use of ICTs in education. Teachers should skilfully redesign learning environments so that students can transfer their newly gained ICTs skills to other applications to use in ICTs rich environment.
✓ Most educational policies reflect the need for local educational content. The development of instructional content-ware remains a neglected area, affecting investments in hardware and resulting in heavy economic and educational loss.
✓ The focus of developing countries should be on how they use ICTs to compensate for the factors that are lacking in education, namely, well-trained teachers and the resources

to pay for expensive equipment. The task is to concentrate on technological alternatives that, at low cost, brings to students the imagination and creativity of a few excellent teachers.

V. PROVISION AND ADVANTAGES OF ICT

ICTs provide a great deal of advantage in the delivery of equitable quality education, thereby providing an opportunity to improve the life of our people (Okafor, 2014). The need to use new technologies to raise the quality and efficiency of education cannot be overemphasized. It is imperative that children, parents and teachers are exposed to ICTs to improve the quality of education and technical proficiency of our human resources, thus leading to increased productivity and accelerated development. The citizens will be prepared to adapt to the global economy and take part in electronic commerce. In addition, children will be provided with a greater understanding of other peoples and cultures.

BENEFITS OF ICTS TO THE CLASSROOM: ICTs have tremendous benefits to the classroom according to Okafor (2014), and they include:

✓ Offer the opportunity for more student-centred teaching,
✓ Give greater exposure to vocational and workforce skills for students,
✓ Provide opportunities for multiple technologies delivered by teachers,
✓ Provide greater opportunity for teacher-to-teacher and student-to-student communication and collaboration,
✓ Create greater enthusiasm for learning amongst students,
✓ Prepare learners for the real world,
✓ Provide teachers with the new sources of information and knowledge,
✓ Provide distance learners county-wide with online educational materials,
✓ Provide learners with additional resources to assist resource-based learning.

VI. GOALS OF ICTS IN EDUCATION

Voogt (2013), states ICTs to cover all the technologies used for holding and communicating information and their use especially in education with overall policy goals of:

✓ Producing ICTs literate citizen,
✓ Producing people capable of working and participating in the new economies and societies arising from ICTs and related developments
✓ Leveraging ICTs to assist and enhance learning for the benefit of all learners and teachers across the curriculum,
✓ Improving the efficiency of educational administration and management at every level from the classroom, school library, through the school and on to the sector as a whole,
✓ Broadening access to quality educational services for learners at all levels of the education system, and
✓ Set specific criteria and targets to help classify and categorize the different development levels of using ICTs in education.

Most developing countries like Nigeria and Tanzania introduced the use of computers in business and the need to train people to operate them. In response to this, Higher Education Institutes introduced both compulsory and general courses in computer science and information technology. The same is also applicable in Nigerian primary and secondary schools, where computer and data processing is made one of the core subjects which every student is expected to pass at credit or distinction levels (FGN, 2004). The Nigerian government planned and started the supply of computers and laptops to secondary schools to make sure that both students and teachers are computer literate. Several private training institutions were also established to train computer literacy.

VII. LIMITATIONS OF ICTS USE IN EDUCATION

ICTs as modern technology that simplifies and facilitates human activities is not only advantageous in many respects, but also has many limitations. Many people from inside and outside the education system, think of ICTs as a Universal remedy or the most important solutions to school problems and improvements. However, many conditions can be considered as limitations of ICTs' use in education. The limitations can be categorized as teacher related, student related, and technological related. All of them potentially limit the benefits of ICTs to education.

Teachers' attitude plays an important role in the teaching learning process that utilizes computers and internet connections. Although teachers' attitude towards the use of these technologies is crucial, many observations reveal that teachers do not have intelligibility about how far technology can be beneficial for the facilitation and enhancement of learning. Of course, some teachers may have positive attitudes to the technology, but refrain from using it in teaching due to low self-efficacy, tendency to consider themselves not qualified to teach with technology. In view of this, Bandura (2006) defines as ''individual's opinion of capabilities to organize and perform courses of actions to achieve particular types of performances.'' More so, as highlighted by Bransford (2010) and Brosnan (2014), attitude, motivation, computer anxiety, and computer self-efficacy are factors affecting teachers' use of computers in their classroom lessons. Teacher resistance and lack of enthusiasm to use ICTs in education according to Okafor (2014) is another limitation.

Moreover, many teachers may not have the required IT skills and feel uncomfortable, nor do they have trainings needed to use the technology in their teaching. Unless teachers develop some basic skills and willingness to experiment with students, ICTs use in education is in a disadvantage (Brosnan, 2014).

Furthermore, the limitation of ICTs use in education is related to students' behaviour. Appropriate use of computer and the internet by students have significant positive effects on students' attitude and their achievement. Nonetheless, it very common to observe limitations related to student behaviour. Students sometimes tend to misuse the technology for leisure time activities and have less time to learn and study. Yousef & Dahmani (2015), describe online gaming, use of 2go, face book, chat groups and rooms, and other communication channels as perceived drawbacks of ICT use in education, because, students easily shift to these sites at the expense of their study. Some students come to school with mobile phones and always fiddle with them even when the lesson is going on (Ikegbusi, 2012). Internet access at home, for instance, may be a distraction because of chat rooms and online games, thereby reducing the time spent in doing assignments and learning (Kulik, 2014). Hence, the impact of availability of ICT on student learning strongly depends on its specific uses.

If ICT is not properly used, the disadvantage will overheavy the advantage. For example, while students use the internet, it may confuse them by the multiplicity of information to choose from. Because of this, the teacher spends much time to control students from websites unrelated to the learning content, because some students, instead of seeking positive information, they resort to watching nude and pornographic pictures and film (Bransford, 2014).

There are major limitations of ICTs use in education as related to student behaviour as provided by Yousef & Dahmani (2015) as:

- ✓ Computers limit students' imaginations,
- ✓ Students often have only a shallow comprehension of the information they download,
- ✓ Over-reliance on ICTs limit students' critical thinking and analytical skills,
- ✓ Students tend to neglect learning resources other than the computer and internet,
- ✓ Computer-based learning has negative physical side-effects such as vision problem,
- ✓ Students may be easily distracted and may visit unwanted sites,
- ✓ Students may have less opportunity to use oral skills and hand writing,
- ✓ Use of ICTs may be difficult for weaker students because they may have problems with working independently and may need more support from the teacher,
- ✓ The students tend to focus on shallow presentation and copying from the internet.

The other limitations of ICTs use in education is technology related. The high cost of the technology and maintenance of the facilities, high of the spare parts, virus attack of software and the computer, disruptions connections, and poor supply of electricity power are among the technology related limitations of ICTs use in education.

VIII. THE KEY CHALLENGES OF ICTS INTEGRATION IN EDUCATION

The integration of ICTs in education systems may face various challenges with respect to policy, planning, infrastructure, learning content and language. ICTs-enhanced education requires clearly stated objectives, mobilization of resources and political commitment of the concerned bodies. Tinio (2012), discusses issues such as analysis of current practices and arrangement, identification of potential drives and barriers, curriculum and pedagogy, infrastructure and capacity building to be considered in the formulation of policy and planning. In addition, it is wise to stipulate educational goals at different education and training levels as well as the

different modalities of ICTs use that can aid and facilitate in the search of the goals. Policy makers need to know the potentials of ICTs in applying different contexts for different purposes. Other challenging points at the level of policy and planning are identification of stakeholders and coordination of efforts across different interests groups, the piloting the chosen ICTs'-based model and specification of existing sources to support ICTs' use over the long terms.

The infrastructure challenges that may exist are absence of appropriate building and rooms to house the technology, shortage of electric power supply and telephone lines, and lack of different types of ICTs. Because of this, one needs to deal with infrastructure related challenges before the planning of ICTs integration to education systems.

With respect to challenges of capacity building, competencies of teachers and school administrators for successful integration of ICTs in the education system, Tinio (2012) expounds further that one impending factor of ICTs integration in education is the skill gap of people implementing it. For instance, teachers need professional development to gain skills with particular applications of ICTs integration into existing curricula, curricular changes related to its use, changes in teacher role, and sustaining educational theories such as constructivism or student-centred learning. Because of this, any attempt of ICTs integration in education should parallel with teachers professional development. The school leadership also plays a key role in the integration of ICTs in education. Lack of support from the school administration is also a big challenge. Thus, for the effectiveness of ICTs integration, administrators must be competent and have a broad understanding of the technical, curricular, administrative, financial, and social dimensions of ICTs use in education (Brosnan, 2014).

Furthermore, learning content and language also challenge the integration of ICTs in education. Content development is a critical area that educators overlook. In integrating ICTs in education, the relevance of the learning content to the target groups will be taken into consideration. With respect to language, English is the dominant language in many of educational softwares, while English language proficiency is not high in many of the developing countries and this is one barrier in the integration of ICTs to education. Another great challenge is the financing. ICTs in education programmes require large capital investment and developing countries including Nigeria, need to predict the benefit of ICTs' use to balance the cost relative to the existing alternatives. Potential sources of money and resources for ICTs' use programmes suggested are grants, public subsidies, fund raising events, Non-Governmental Organizations (NGOs) , community supports, revenues generated internally and revenues earned from core business (Tinio, 2012).

IX. CONCLUSION

Information communication technologies are manipulating all aspects of life including education. They are promoting changes in the working conditions, handling and exchanging of information, teaching-learning approaches and so on. The impact of ICTs is so significant in education, this shows that ICTs are making major differences in the teaching approaches and the ways students are learning. ICTs-enhanced learning atmosphere promotes active, collaborative, creative, integrative and evaluative learning as a great advantage over the traditional method. Finally, the study concludes that despite some limitations and disadvantages of ICTs, it is still believed that ICTs are beneficial because there is a consensus that development of any country depends on the quality of education offered to its citizens. Computer and the internet are especially useful to promote student engagement in learning and positively impact students' performance and achievement.

X. RECOMMENDATIONS

The following recommendations are hereby proffered:
- ✓ There should be mainstreaming of ICTs application especially the computer and internet in education systems at all levels, for they benefit curriculum implementation and promotes students' learning.
- ✓ Teachers should always engage themselves in the use of computers and internet as it will aid them in teaching in classroom.
- ✓ Government should on regular basis sponsor teachers for the acquisition of computer knowledge as this will make them be more knowledgeable in the use of computer and internet.
- ✓ Policy maker in education should always inculcate and evaluate the roles of computer in education, for it will help to work for the effective functioning of ICTs in their education system.

School children should also offer computer as a compulsory subject from primary school to tertiary education as this will help them develop in the use of computer effectively.

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