Integration of ICT in Education: Key Challenges

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Abstract—In many countries, education is more than a means for enabling progress and avoiding poverty; it is also critical for the development of knowledge societies and knowledge-based economies. It has been suggested that information and communication technologies (ITCs) can play a number of roles in education. Although lessons may be learned from best practices around the world, there is no specific or best formula for determining the best level of ITCs integration in the Education. Many researchers suggested that the role of higher education institutions within the context of knowledge-based economies and globalization is to provide individuals the ability to transform information into socially beneficial knowledge, skills, and value; modernize societies and improve the standard of living [1, 2, 3]. This paper examined some key challenges faced by the higher education institutions (HEIs) in integrating information and communication technologies (ICTs) into teaching and learning. This paper argues also that the main purpose of integrating ICTs in education is to provide extra approaches that can be used to address the serious environmental, cultural and educational challenges faced by policymakers, educators, educational administrators and students in higher education. The paper concludes by providing some essential elements that can be used in integrating ICTs use in education.

Keywords—Education, HEIs, ICT, ICTs integration

I. INTRODUCTION

One of the major problems of using Information Communication Technologies (ICTs) in education is to base choices on technological possibilities rather than educational needs. The educational effectiveness of ICTs depends on how they are used and for what purpose, like any other educational tool or mode of education delivery, ICTs do not work for everyone, everywhere in the same way. In the different part of the world the use of ICTs is different depending on the affordability, availability and access to technology. The fact that ICTs used with much great regularity in universities in developed nations has resulted in different ICTs problems in the developed and developing world’s [4].

In our days in the developed world Higher education institutions deal mostly with the problems of interdisciplinary of technologies and departments, global responsibility, and sustainable development, in the other hand the less developed world faces more serious problems such as massive growth in enrolment and institutional development, bad governance, high costs, poor and uneven distribution of ICT resources and infrastructure, incorrectly viewing ICT as a problem for organizational transformation, not making ICT responsive to the organizational vision and mission, and developing a non-systemic method of implementing ICTs [5, 6, 7]. Beside the above problems there is a potential impact of the used of ICTs in education in general but it is difficult to demonstrate that potential of technologies in addressing specific teaching and learning problem faced by the Higher education institutions. This paper discussed the challenges faced by the higher education in general in integrating ICTs used in the process of teaching and learning.

II. ICT AND EDUCATION

Many researchers address the issue of ICTs integration in higher education and suggest that policymakers and teachers can play an important part in this dimension [7, 8, 9]. Both groups (policymakers and teachers) need to understand how technology and the education system interact with each other. The integration of ICTs in higher education brings many opportunities and also causes more challenges; that is why it is very important before implementing the use of ICTs to make sure that suitable levels of investment is in place, adequate training, good policy, careful planning, restructuring the teaching process, and a systematic approach also are require when integrating ICTs in education in order to achieve maximum educational benefits. It is also vital to think carefully about purpose of education or the context in which the ICTs can be used before implementation. In our previous work we defined education as an engine for the development and improvement of any society.
It does not just impart knowledge and skills, but it is also responsible for building human capital which breeds, drives and sets technological innovation and economic growth [9]. From the above explanation we can say that ICTs are simply tools that help us achieve a purpose of education. In educational settings, this purpose will be linked to improved teaching and learning for students. ICTs do not in themselves improve student’s learning opportunities; but educators who use ICTs thoughtfully do. Kirkup & Kirkwood (2005) and Wagner (2001), argue that it is the contextualized teaching and learning needs that ought to drive the ICTs intervention, rather than the technology itself.

III. ROLE OF ICT IN EDUCATION

ICTs have developed as powerful tools for diffusion of knowledge and information. Their fast growth has already taken place all over the world; however the integration of ICTs in education has deep effects for the whole education process ranging from investments to use of technologies in dealing with key issues of access, equity, management, efficiency, pedagogy, quality, research and innovation [10]. The growing use of ICTs as an instructional medium is changing and will possibly continue to change many of the strategies employed by both educators and students in the teaching and learning process. The data in figure 1, ICT indicator database describe the world internet penetration rates by geographic region.

The above result shows the significant impact of fast growth use of ICTs used in the whole world. It is inevitable as Yelland (2001) argued that organizations that do not fit in the use of new technologies provided by ICT’s cannot significantly claim to prepare their students for life in the 21st century.

This argument was supported by Grimus (2000), who pointed out that “by teaching ICT skills students are prepared to face future development based on proper understanding” (p.362). A confirmation of their arguments is show also in figure 2 below.

With these results it is convinced that the presence of ICT in education sector is also increasing steadily. As Neeru Snehi (2009), argued that ICTs can play enormous role for improving access and equity in education system in general and higher education in particular. As regards with education, the use of ICTs offers benefits to both teaching and learning activities also leads to the changing in teaching and learning process. In the follow section we will answer two questions that arising in the use of ICTs in education. II paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified.

A. Does ICTs-enhanced learning?

The use of ICT in education provides problem based learning and enables students to be independent, have a critical thinking. The impact of ICTs on learning can be approached in various ways to meet the need of learners [14]. Research has shown that the use of different approaches offered by ICTs enhance teaching and learning by transforming the environment into the one that is learner-centered and promote deep learning.

B. Will the integration of ICTs in education replace the educator/teacher?

This is a major question of all when thinking about the integration of ICTs in education. But the answer this question is NO. It is obvious that by integrating the use of ICT’s in education, educators/teachers will develop strategies that will promote deep learning and change the learning environment into the learner-centered environment.
As learning shift from the teachers-centered model to learner-centered model. All these strategies/techniques used by ICTs shift in the role of a educator/teacher more to that of a facilitator and less the sole voice of authority in the classroom [15].

IV. KEY CHALLENGES IN INTEGRATING ICTS IN EDUCATION

Although valuable lessons may be learned from best practices around the world, there is no one formula for determining the optimal level of ICTs integration in the education system. The concerns such as who will manage this process of ICTs integration in education develop policy guidelines and strategies. There are significant challenges in integrating ICTs use in education rising from environmental, cultural and educational faced by policy makers, educators, educational administrators and students in higher education. The following section we discuss these challenges in details.

1) Environmental challenges

People are expected to be able to work, learn, and study whenever and wherever they want to; this in developing world this still not possible. A country’s educational technology infrastructure sits on top of national telecommunications and information technology infrastructures. There is a limited regional infrastructure for the full ICT’s integration in education. It is very important for policymakers and planners before any ICT implementation in education to carefully consider the following:

- Appropriate rooms or buildings available to house the technology. In countries where they are many old buildings, ensure proper electrically wiring, heating/cooling and ventilation and also security and safety will be needed.
- Availability of electricity and telephony in most developing countries where there still large areas without a reliable supply of electricity and the nearest telephones are miles away.
- Policymakers should also look at the ubiquity of different types of ICT in the country in general and in the educational system in particular.

2) Cultural challenges

Diversities of culture in different part of the world are also challenges in introducing ICT in education. English is the dominant language of the internet.

Research has shown that an estimation of 80% of online content is in English [18]. A large proportion of educational software produced in the world market is in English also. In most countries where English is not the first language this represents a serious barrier in integrating ICTs use in education system. Using the example of India [10] and Pakistan [1], the majority all the websites in the world are in English. This situation limits the information access for some people who has lack or no ability in English language. Similar to the situation in South Africa [15], where student’s multilingualism background causes a major challenge in the role of ICTs in South African higher education system.

3) Educational challenges

One of the greatest challenges in ICT integration in education is balancing educational goals with economic realities. ICTs in education require large capital investments. Due to financial difficulties, government in some part of the world specially developing countries priority is the rehabilitation of school buildings and teacher welfare. ICT for education on the other hand has not yet been considered a priority. In term of human resources, the constraints are due to the lack of trained teaching manpower and lack of motivation among educators to adopt and integrate ICT as a tool into their teaching or educational curriculum. Extra effort and time involve in the use of ICTs in education. In some part of the world due to educational background generally there is lack preparedness for students entering higher education in the knowledge and skills required for the basic use of technologies. Still in educational, learning challenges arise in the delivery methods of using ICTs (online-based, blended etc.), content not adapted to the technology and context, limited interaction between students and educators.

In general, integrating ICTs use in education requires establishment of infrastructural facilities, acquisition of technologies and their periodic updating, management and professional support services [12]. The following list some essential elements that can be used in integrating ICTs use in education system in general.

V. ELEMENTS OF PLANNING FOR ICTS INTEGRATION IN EDUCATION

Some researchers argue that many instructional design models of ICT integration in education are currently available to help policymakers and teacher-designers plan effective ICT integration into the curriculum [16].
Following some examples like the ASSURE (Analyze learners; State the objective; Select method, media and materials; require learning participation; Evaluate and revise) model [17] and other models design for instructional. These models show guidelines for incorporating various resources and tools into teaching and learning. Below in Figure 3 we present a systematic model for designing of the elements of planning for ICT-integration in education. We adapt the model presented in [16]. Development of each element in the model depends very much on the completion of its previous elements. This model essentially provides an easy-to-follow structure, where designers move to the next element only after they have completed the current component. Most importantly, this model requires policymakers and teacher-designers to clearly explain why the technology is used (the Rationale element), and how to effectively incorporate the technology (the Strategies element). The essential elements of this model are to be explained in detail below.

**Problem statement**

The first stage describes the major problems or issues to be addressed in integrating ICT in education. This serves as a starting point for the ICT integration plan. The problem should be reliable, structured, and challenging mostly relevant to the proposed goal learners rather than to the teacher-designers.

**Analysis**

There is a need to analyze present state of educational system. Basically the integration of ICT in education must take inconsideration current practices and arrangements in educational sector. Current barriers to ICT used need to be identified, including those related to curriculum, infrastructure, capacity-building, language and content, and finances.

**People interest**

Before integrating ICTs use in education we have to consider also the type of learners and their geographical region. The challenges faced by students and educators in developed countries are not the same as challenges faced by students and educators in developing countries.

**Technology selection**

The selection of the technology is very important. ICTs are not used the same way everywhere. In order to address the problem and achieve the learning objectives, policy makers and teacher-designers need to carefully compare all possible technologies that can be used for learning. The technologies in this model may include software such as multimedia courseware, web-based resources, communication tools (such as voice chat, textual discussion forums, or video conferencing), mind tools (such as concept mapping tools and multimedia authoring tools), or any other possible ICT tools [16].

**Rational**

Johnson & Aragon (2003), argue that inappropriate use of technology can lead to negative effects. Following this argument we can say that the selection of ICTs used in education should be used to enable the process and enhance teaching and learning.
There is a need for policymakers and educators to specify educational goals different education levels as well as the different modalities of use of ICT. Roblyer, Edwards, and Havriluk (2004) suggest that for rationalizing the use of technology the following must be considered: i) high motivation; ii) unique instructional capabilities such as helping students visualize data/problems or tracking learning progress; iii) support for innovative instructional approaches such as collaborative learning and problem-based learning; and iv) increased teacher productivity and student knowledge construction [18]. From the above argument it is vital for policymakers and Teacher-designers to choose suitable technology and justify i) why it is needed to be used in education; ii) what added values the technology can offer in education; and iii) how the technology can support the teaching and learning process.

**Strategies**

We said in this paper that the growing use of ICTs as an instructional medium is changing and will possible continue to change many of the strategies employed by both educators and students in the teaching and learning process. That is why after determining what technology is needed to use and why, policymakers and educators now must decide how to effectively and meaningfully integrate the selected technology into education. It is important to understand that the strategies for ICT integration will differ from one region to another depending on the educational interest of the people.

**Reflection**

A need to reflect upon the type of technology used in integrating ICT in education is the focus on the appropriateness of the technology chosen to be used, strengths and weaknesses of the technology, and possible improvement. Policymakers and educators in this phase also provide additional propositions on how technology can be used in different level to improve teaching and learning in different contexts. The above propositions may contain other technology, instructional methods and activities, assessment approaches, and ways to improve the integration of ICT [16].

**VI. ELEMENTS OF PLANNING FOR ICTS INTEGRATION IN EDUCATION**

The integration of ICT use in education is a main way in facing globalization and it would respond to the type 21st century society that we living in. ICT integration in education is a broad process of applying technology to the curriculum to improve teaching and learning process.

The use of ICT can play a number of roles in education by changing the teaching and learning process. However ICT integration is not easy task. There are significant challenges in integrating ICTs use in education rising from environmental, cultural and educational faced by policymakers, educators, educational administrators and students in higher education. Thus there is a need of government authority support and the higher education institutions commitment to making the integration of ICT in education a successful process.

**REFERENCES**


