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## ICT for Education (ICT4E) – the Problem Zone

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### **Abstract:**

*There have been several debates in the academic and non-academic front on Information Communication Technologies (ICT) usage in education and pedagogy. While several policy initiatives have also been made in the global, regional and national front to catalyze the potentials of ICT to build knowledge based society, there are some serious issues that need to be addressed if one is to reap the full benefit of ICT integration in education.*

*The paper is reflective in nature and provides an assessment and evaluation of the key policy directives that need to be taken in the context of ICT in Education (ICT4E). The discussions are based on a review of several literatures on ICT and education.*

**Keywords:** *ICT for education (ICT4E), higher education, knowledge society, education policies*

### **1. The Information Communication Technology (ICT) Interface**

ICT integration in Education is considered indispensable in the approach to be taken by universities and government policies if they are to develop a Knowledge based society. ICT developments are expected to result in cost effective, efficient transmission, retrieval and analysis of information. Quah (2003) claims that knowledge in the global economy is used as both an input and an output; “Digital goods are bitstrings, sequences of 0s and 1s, that have economic value. They are distinguished from other goods by five characteristics: digital goods are nonrival, infinitely expansible, discrete, aspatial, and recombinant”. ICT offers the tools for active participation in the society, adding to Marshall McLuhan’s global village. On a similar line, Castells (2001) discusses how global civil society, government regulation, and economic development can be influenced by information technologies. Harold Adams (1951) discusses that ICTs signify an interface of mind and matter. Hence, changes they create in communication environments would lead to changes in “collective mentalité”; bringing about unavoidable changes in society and culture.

Heeks (2002) lays emphasis on ‘iDevelopment not eDevelopment’ using ICT and has come up with various suggestions for policy building. (Gundrey, Murphy and Rao ,1993; and Neil Butcher, 2012) talk about internet facilitating a wider interactive communication and network which can impact individuals/organizations. World Summit on the Information Society (WSIS, 2013) states the issue of exploiting the full potential of ICT to bring access and support sustainable development. The types of knowledge activity taken up by universities have been described as one in which epistemic tradition in specific disciplines continues and another which is interdisciplinary and more relevant to the industry. Some scholars believe that with current ICTs, the later type of knowledge can be applied where required. This has led to the emergence of entrepreneurial model of academic research which can influence the economic growth of society (Etzkowitz et al.2012; Gibb, 2013 and Klofsten, 2013).

(Stoll, 1995; Talbott, 1995) along with other scholars have commented on ICT being over hyped. Researches show that indiscriminate uses of ICT do not lead to knowledge societies. (Melody, 2006, 1996c) commented that often time, ICTs are based on corporate needs; interventions in telecom policies are vital. Knowledge society development is unique to each country where telecom facility system and ICT services according to Melody play the crucial role. ICT enable educational change and improve the quality of education; they prepare individuals for the global economy and knowledge society (Kozma & Wagner, 2005) thereby impacts the education sector and economy of a nation. Hence their linkage to national policies is necessary to address the constraints faced in developing countries (Oliver et al, 2001; Sibiya, 2003; Perkman, et al. 2013). Kaino (2004) and Shan Fu (2013) highlight ineffective ICT policies leading to underutilization.

Jaffer et al.(2007), Ward, L. and Parr, J. M. ( 2010) mention how ICT is also used for scholarly community engagement, and administration in higher education. Universities are subject to the limitations of ICT one such challenge is updating to the latest technological advances. Other challenges are in terms of pedagogical thinking and organizational structures (Laurillard, 2002). Advancements in ICT call for trained professionals in both its technical and pedagogical units. ICT is changing the way universities function and is crucial for “tackling the impacts of massification, diversification, internationalization and marketization in higher education” (Ward, L. & Parr, J. M., 2010). It cannot be detached from educational, administrative and logistic concerns; ICT needs to be implemented in institutional policy documents.

## 2. ICT for Education Policies

Paisley (1985), mentions the first revolution in information technologies brought by films, radio, television and satellite broadcasting; and the second revolution brought by telecommunications and microcomputers. The third revolution brought by the integration of telecommunications and microelectronic technology in computing has enabled an individual to interact in a network of worldwide electronic community (Papagiannis et al, 1987). The fourth revolution has the term 'globalization' associated with it. Globalization is ascribed to bring about interconnectedness through international exchange and transnational interaction, dissolve economic borders and make the world a single global society (McGrew, 1992). The impact of ICT in higher education can be seen in terms of the extent to which technology use enables individuals of these institutes to participate and be a part/ node in the networked knowledge society. As (Haddon, 2000) puts it: "the extent to which ICTs enhance our abilities to fulfill active roles in society, or being without them constitutes a barrier to that end". Policies need to look at current patterns in information usage and ICTs used in this process. Studies conducted have proved that just a mere increase in infrastructure does not entail for successful deployment of ICT.

Kozma (2008) discusses how policy makers have recognized the potential of ICTs to restructure organizations, advance collaboration, increase democratic participation and enhance the social integration of individuals with different abilities and groups of different cultural background. Current trends are seen in ICT enhanced collaborative learning and knowledge building (Shan Fu, 2013). Kennedy (2001) states that ICT shifts, education from just elite learning to mass learning as it provides greater accessibility. In spite of its potential, the high rate of failures result from poor ICT implementation. Chatterjee et al. (2002) emphasize that for ICT to be successful, it has to assimilate in an organization wherein ICT diffuses across organizational work processes and becomes a regular and essential part in the activities associated with those processes.

Roger's Diffusion of Innovation theory tries to explain assimilation of ICT in an institution in three stages: initiation stage, assimilation stage and post-adoption stage (Rogers, 2003). (Tornatzky & Fleischer, 1990) came up with TOE framework where technology, organization and environment variables affect ICT assimilation in an organization. Scott (2007) discusses the importance of technically capable ICT staff in an organization who can adapt to the users' requirements and also the technological and environmental needs. Organizational culture and change process according to Scott further affect the assimilation process. Orlikowski (1991) came up with the Structuration Theory of Technology Assimilation which gives interpretive flexibility. It looks at the relationship between humans and technology and the context in which technology is developed and used. Technology assimilation will depend on technology, human agent, and institutional properties. Human agents create and use technology; and technology causes the human agents to change their routine practices. Both act as mediators in the ongoing process (Orlikowski, 1992). A Web Assimilation model developed by Chatterjee et al (2002), top management championship, strategic investment rationale, and the extent of coordination affect the assimilation of technologies. Clark et al (2008) discusses that since ICT assimilation involves different actors, there is a need for shared values for the new innovation.

ICT implementation requires infrastructure and human resources; technology has to be user friendly; and an organization requires support staff to guide the users in skills to implement Internet-related applications (Hargis, J., 2010). The emphasis laid here is on ICT human resource termed as 'translators' (Paul and Berranger, 2002). They are the link between the users and the technology; they increase the organization's learning capability. (Kling, 1980; Markus and Robey, 1988; Haslinda et. al, 2013) objected the overemphasis on technology and technocrats driven changes in ICT adoption; they stressed the need to focus on the process driven changes brought about by technology. And this process involves various social actors. Orlikowski (1992; 2000) mentions how such changes brought about by ICT challenge existing cultures, structures and power relations in an organization. Different contexts and different users assign varying meanings to ICT and its change process (Orlikowski, 1992; Haslinda et al., 2013). Hence often time there is a difference in interpretation of ICT from its assigners, developers and users (Haslinda et al, 2013 and Hanaa, 2014).

On the basis of above discussions the following questions arise in the context of ICT implementation in higher education:

1. Does exposure to profusion of Information using ICT change the way knowledge is being created? Do virtual sharing systems enable a new or different kind of knowledge system?
2. Are the students in the Universities actually using ICT to fulfill the plans laid by the education policies? What are the conditions that facilitate knowledge creation?
3. How can knowledge be effectively transferred using ICT? What are the inhibitions towards knowledge acquired from internet sources? What about the issue of Digital Divide within these educational networks?

## 3. ICT for Education (ICT4E) – the Problem Zone

Considering the stress made on Knowledge network, through ICT in various policies, policy-makers and stakeholders in Higher education need to examine the challenges and constraints of integrating ICT4E. Information is considered as the main capital for knowledge societies wherein ICT is expected to be the catalyst in Higher Education. ICT infrastructure alone does not fulfill the vision and policies as highlighted in policies. ICT4E would require a shift in instructional paradigm. Castells (2000) highlights the knowledge gap "the use of the Internet, both in school and in professional life, could amplify the social differences rooted in class, education, gender and ethnicity". The issue Castells mentions is that digital divide leading to knowledge gap is rising because of the manner in which technology diffusion is taking place. "Key urban centers, globalized activities, and the higher-educated social groups are being included in the Internet-based global networks, while most regions and most people are switched off" (Castells, 2000). Higher education institutes need to instill in their students not just 'operationalism' but deeper understanding of their social and cultural context. There is the fear that understanding, insight, wisdom and critique are being supplanted by skill, outcome, information

and flexibility (Midgley, 1989). On the other hand, ICT is associated with empowerment, enhancing social connectivity, accessibility to education, public and government services (UNESCO, 2011).

One of the challenges for the internal development of higher education institutions is created by the implementation of rapidly changing information technologies. Higher education institutions are not only contributing in knowledge advancement, but are also reliant on the information network and subject to the restrictions of ICT. Both students and teachers need to re-assess their notion about learning and instruction. Therefore, the issues around ICT4E are not only oriented to technology, but are also towards attitude in pedagogy and culture of the institutes. ICT in education necessitates trained support staff to aid in pedagogy (Laurillard 2004; Hasenbegovic et al. 2006). As much as ICT is reconstituting the higher education scenario and its stakeholders and its delivery mechanism, there are arguments about the role of higher education in this juncture. A school of thought supports the notion of universities being industry oriented (Kohli and Health 2001, Todd Davey et al.2011). But Williams (2000) writes that universities are already too focused on employment and industry, which is detrimental to their teaching and research. He is representative of a more idealistic school that argues that universities should help build pure knowledge, social capital and the capacity for critical thinking; they have attributed ICT education being unsuccessful owing to its technocratic stance and lack of local and real world problems contextualization.

Rationalized and modernistic approach not suitable for a country can cause disruptive tensions between local and foreign academics. However, ICT skills are considered equally important to reading, writing and arithmetic (Bohme, 2002). The impact of ICT in higher education can be seen in terms of the extent to which technology use enables individuals of these institutes to participate and be a part/node in the networked knowledge society. As Haddon (2000) would put it: 'the extent to which ICTs enhance our abilities to fulfill active roles in society, or being without them constitutes a barrier to that end'. Understanding the actual functions of knowledge society requires scholars, policymakers and the public to recognize contemporary models for deployment of knowledge and distribution of technologies.

Universities have been at the forefront to develop ICT and must be at the forefront in using them (UNESCO, 2011):

- In access: "distance" and "virtual" institutions allow for growing numbers of students to access higher education, in more remote areas and at any time of day and night.
- In teaching and learning: whose efficiency, many agree, is increased by ICTs. Courses are enriched by videos and various other multimedia devices. Students' learning experience is considerably enhanced because they live the situation from different viewpoints and can compare data online. Moreover, learning being learner-centred rather than teacher-centred (self-tuition), they are able to match the learning they receive with their individual learning styles, capacities and speed. Learning is based on the capacity "to find, access and apply knowledge to problem- solving" (Salmi, 2001).
- For academic staff: with the use of educational software, teachers may be seen as serving as guides rather than lecturers and transmitters of knowledge. It is also believed that ICTs are a great time saver for teachers. However, this is controversial as, even if fewer academic staff is needed, they have to be trained to use ICTs and work with technology specialists: more technical, specialized staff should, therefore, be hired.
- In matters of costs: although investment in equipment and in initial course development is more costly, it is believed that teaching will eventually become cheaper, as it will in the long run attract more students, necessitate less administration, less teaching staff, less travel, etc.

Universities must determine what they will implement, how much, where and what consequences they expect from the use of ICTs. Hence assessment is required to understand educational policies towards increasing ICT connectivity for education and towards the systematic integration of ICT. When it comes to specific policies on ICT in education, the elements that need to be reviewed include Allocation of funds; Hardware allotted in a cost effective manner, targeted student-computer ratios, the configuration and placement of ICT facilities, and technical support for students and teachers; Softwares used and Service providers; Teachers (are they first generation users?); Adaptation of curriculum accordingly; Staff to support computers and related technology in schools; Network infrastructure for teachers and students to gain access to knowledge and share information; Infrastructure development; Interoperation of information systems; Development of technological standards; Research and development; ICT education and training; National ICT development coordination; International interface and cooperation; Access to infrastructure; Access to information; Monitoring the use of ICT and Measurement of the impact of ICT.

The discussion leads to the following questions:

1. What would be the demands from the knowledge economy for changes in the organization of higher education and the way knowledge is managed within the education system using ICT?
2. What about the issue of Digital Divide within these educational networks?
3. What are the issues which are looming but have not been analyzed in the public debate?

#### 4. Discussion and Conclusion

It is noticed that in knowledge societies facilitated by ICT, exponential growth in the quantity of knowledge produces a growing gap between those who have access to knowledge and learn to master them, and those who cannot. It is essential to reduce the digital and knowledge divide. Training in the new information and communication techniques requires the art of navigating to avoid information overload. It is not just juxtaposing information but it involves using information for building and structuring knowledge. ICT-based innovation can and does occur in classrooms and schools without there being a close linkage to national policy. Without a strategic rationale to guide the national the use of technology in education, ICT policy is only operational. Policy becomes techno-centric,

promoting the purchase of equipment or the training of teachers without providing a strong educational purpose or goal for the use of technology. UNESCO (2011) mentions that "it is not enough for teachers to have ICT competencies and be able to teach them to their students. Teachers need to be able to help the students become collaborative, problem-solving, creative learners through using ICT so they will be effective citizens and members of the workforce". The four main rationales for introducing ICT in education can be summed as (Cross and Adam, 2007).

Social: Perceived role that technology now plays in society and the need for familiarizing students with technology.

Vocational: Preparing students for jobs that require skills in technology.

Catalytic: Utility of technology to improve performance and effectiveness in teaching, management and many other social activities.

Pedagogical: To utilize technology in enhancing learning, flexibility and efficiency in curriculum delivery

Successful ICT4E for managing change requires accessibility, quality assurance, amendment of related policies, international collaboration, standardization of learning technologies, human resource development and recruitment. A committed approach on the part of National Policies supporting the transformation is critical to ICT4E success. Continuous development and support should be key for any constructive change. The process of change must not only be backed up by a clear plan but also good implementation to ensure effectively achieving the desired goal. This would require transforming ICT for education policy into action; regulatory framework dealing with the use of ICT in education; Inter-ministerial collaboration/dialogue; leadership and management of ICT in education programmes; distributed leadership; continuous and ongoing change management at all levels.

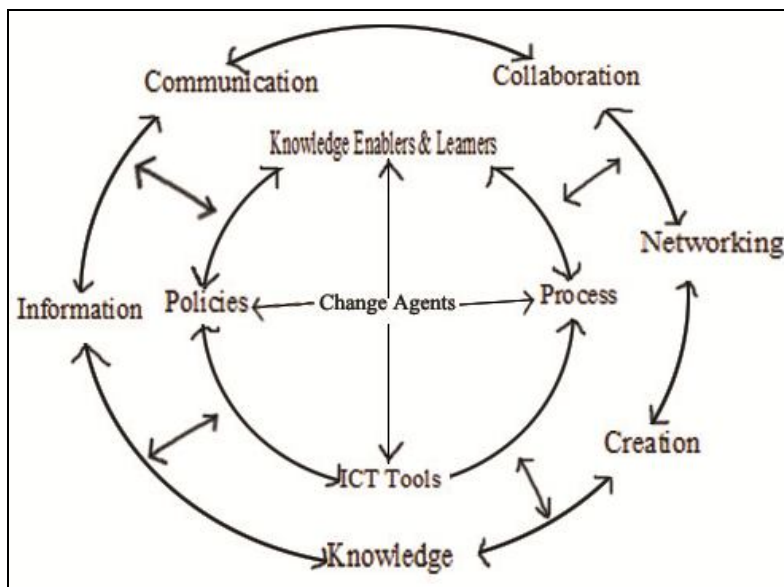


Figure 1: Communication loop for ICT4E towards Knowledge building

Information literacy is a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information." Information literacy competency focuses on five broad abilities: to recognize the need for information; to know how to access information; to understand how to evaluate information; to know how to synthesize information; and to be able to communicate information (Isbell and Hammond 1993).

Policies are required to look into areas engaging the stakeholders in higher education leading to system-wide reform with the capability to manage and coordinate ICT4E. Thus a systems approach to ICT4E is more strategic and cost-effective in the long run.

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