**Journal of Educational Policy and Entrepreneurial Research (JEPER)** www.iiste.org
Vol.1, N0.2, October 2014. Pp 144-150

# Information and Communication Technologies: A Look at Policy in Higher Education for Sustainable Development

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**Abstract**:
Information and communication technologies (ICTs) can be most strong enabler in efforts to bring positive and sustainable development in all the countries of the world. Evidence from large studies and meta-analysis suggests that use of ICTs, in particular computer technologies, is correlated to positive academic outcomes, including higher test scores, better attitudes towards studies, and better understanding of concepts and ideas. For better performance in traditional measures of academic achievements, a secondary benefit of ICTs in higher education is to introduce new generations with the technologies that have become important components of the modern world. ICTs provide new ideas to students and teachers with which way to learn and teach for development. We have to highlight the needs for policy that gives a vision and frame work for using ICTs within the higher education system. This paper aims to present the current state of how ICTs is being used in higher education and how this policy is beneficial for development and how it can better benefit current and future users.

**Keywords:** Information and Communication Technology Policy, Development, Quality Improvement.

## Introduction

Higher education systems have risen in the last five decades to meet the demands of quality education for all. This aspect has further gained strength due to rapid preferment in Information and Communication Technology (ICT). The main goals of ICT policy adoption in the higher education field are reducing costs per student, making higher education more affordable and accessible, increasing enrollments, improving course quality, and meeting the needs of local employers (Ozdemir and Abrevaya, 2007). Demand for trained and experienced labor is ever increasing in existing societies. In this backdrop, access to quality in higher education for all, has come forth as determining factor of economic growth and development. To increase the access to higher education and improving its reach to the rural parts of the country, contribution of learning facilities are promoting. There is a worldwide need felt for integrating ICT into higher education in order to improve the pedagogy to reflect the societal change (Plomp, Pelgrum and Law, 2007). The last two decades have give evidence about the inclusion of developments in ICTs in higher education systems around the world and still the challenge to develop a higher education system that is flexible and dynamic so as to incorporate the technology in the management and delivery of learning programs is discouraging. In this article, the first section aims to present briefly the role of ICTs policy in higher education and in the second section the areas are discussed in which it can be incorporated to play important role for the development. The final part explores the challenges in expanding the policy and the need of further recommendations in it for future development in higher education.

## ICTs Policy in Higher Education System Should Address the Following Elements for Development.

It is important for any policy to outline the preparatory steps needed to ensure that universities and other components of the education system are ready to use the technologies for educational purposes. Some of the criteria

for education-system readiness include appropriate national and university level policies, awareness by university management of the advantages of ICT for education, a plan and management system for using ICT, potential management and administrative uses, initial investments necessary and expected recurrent expenses. These are the elements which ICTs policy should address:

- ICTs policy statement needs to address the type of hardware, operating systems and software that would be conducive to university environments in the county, or at least to identify a decision-making framework. This includes models for efficient, affordable, quality access to the Internet for universities. Such elements would also need to set student-computer ratio targets and technical support mechanisms.
- Teachers need to understand the application of ICT to support their teaching and administration. Therefore policy should identify ways of improving teacher capacity in the use of ICT as well as their specific integration into teaching systems and pedagogical models. The policy should also outline the type of additional staff required to support computers and related technologies.
- The value of using ICT in the universities is best realized when appropriate content is developed and used to enhance and support learning, teaching, administration and management. This involves the production and consumption of local, relevant and appropriate education content through multimedia application of ICT. Therefore, policy in this area is vital to provide for the development and use of content.
- Policy on research and evaluation is critical within the context of dynamic and changing ICT and its application to the education environment. The constant research and evaluation agenda will ensure that improvements are made to how ICT is used in the education system, and this data and analysis will contribute to any review of policy.
- ICT on its own has limited uses in the education and training system. Its intrinsic value lies in the integration of the technology to support and enhance learning and teaching in various subjects. Policy options that identify mechanisms and frameworks that encourage this integration are, therefore, important.
- Implementing ICT in the education sector requires a substantial amount of money and skilled personnel. Therefore partnerships between government and the private sector, development agencies, universities communities and others become important. The identification of this approach is important to include in ICT policy document.
- The use of ICT in the education system requires different levels of technical support. Policy on using ICT in higher education needs to identify the levels of technical support necessary and outline how those needs would be addressed. For example, the first line of technical support would need to be based within the university, which requires the training of teachers. Further technical support via help facilities, contracts with local technicians and companies could also be factored into the policy.
- The ongoing support of teachers is crucial to enable increased and better use of ICT. Such support would include how to integrate the use of ICT when teaching different subjects. Policy in this area will also indicate to the teachers what is expected of them and the type of support they could expect.

## Benefits of ICT Policy

- **Quality Improvement in Higher Education through ICT Policy**: ICT can enable teachers to polish their practices by providing them with improved educational content and more effective teaching methods. Continuous teacher training in updating and enhancing their methodologies is critical to effective ICT policy and practice to keep pace with the constant advancement of technology. Through online teaching resources and other interactive educational materials, teacher development can be greatly improved. ICT can improve the learning process through the provision of more interactive educational materials that Education leadership, management and governance can also be improved through ICT policy by enhancing educational content development and supporting administrative processes in educational establishments. By supporting management and reforming administrative procedures more effectively, ICT would serve as an incentive for leaders and staff at all levels to institutionalize its use increase learner motivation and facilitate the acquisition of basic skills. The use of various multimedia devices such as television, videos and computer software can offer a more challenging and engaging learning environment for students.

- **Access and Equity in Higher Education through ICTs Policy:** ICTs are very powerful tool for diffusing knowledge and information, a fundamental aspect of the higher education process. ICTs can play enormous role for improving access and equity in education sector in general and higher education sector in particular.

E-learning is emerging as an important strategy to provide widespread and easy access to quality higher education. E-learning is a generic term referring to different uses and intensities of uses of ICTs, from wholly online education to campus-based education supplemented with ICTs in some way. Although, presently the initiatives for development of e-learning are continuing in a sporadic manner, HEIs are advocating and making efforts to enhance the quality of higher education by framing policy guidelines for their integration in classroom and other activities. ICT can be used as a tool in the process of higher education in the following ways:

- **Informative tool:** It provides vast amount of data in various formats such as audio, video, documents.
- **Situating tool:** It creates situations, which the student experiences in real life. Thus, simulation and virtual reality is possible.
- **Constructive tool:** To manipulate the data and generate analysis.
- **Communicative tool**: It can be used to remove communication barriers such as that of space and time (Lim and Chai, 2004).

- **ICTs Policy for Economic and Social Development:** Development has often been understood in narrow terms to be about increasing income and improving the standard of living in a country but this concept does not take note of the importance and implications of how a society and people develop. Indeed there is increasing recognition that development should have people's growth as its central pillar, along with economic growth. Knowledge and human capital are essential to all aspects of development and key to this form of development is to ensure that all people in a country have the ability to acquire and generate knowledge. This is where ICTs become vital, as they are the primary tools to enable the acquisition, generation and use of knowledge that forms the bedrock of the effective development. However, just having new hardware and software is no guarantee of development. The "warm ware" - that is, the people - are perhaps the most important cog in this wheel. ICT is enhanced by a policy that ensures people are capable of using it to source and assimilate the information and transform into useful knowledge. The key point is that using ICT for development depends upon economic, social, cultural and technological factors. All of these factors need to be taken into account when creating an environment and conditions that will encourage and provide opportunities for using ICT to support the development processes within countries. Therefore, the task for us within the education sector is to identify ways of creating those necessary conditions within the education system to maximize the benefits of ICTs thus support development. With the appropriate conditions in place to benefit from ICTs, our learners (at all levels of the education system, i.e., within the schools, colleges, universities, non-formal learning environments, etc.) can benefit and build both themselves and their society. This is becoming increasingly important in developing countries that are quickly losing their traditional advantage of lower labor costs. Clearly in a world that is increasingly being driven by technology and access to knowledge, low labor costs will not be seen as a comparative advantage for much longer.

## Factors Affecting the Adoption of ICT in Higher Education

The main factors that affect the adoption of ICT in higher education are the mission or goal of a particular system, programs and curricula, teaching/learning strategies and techniques, learning material and resources, communication and interaction, support and delivery systems, students, tutors, staff and other experts, management, housing and equipment, and evaluation (UNESCO, 2002). Cost efficiency is attracting many private players in the field of internet enabled education. This is also being driven by technological advances, competitive pressures and the positive experiences of many early adopters (McGorry, 2002) National vision, supported by coherent strategies and actions is the most important factor in integrating ICT in education. Successful implementation of ICT requires

strong national support from government and local support from relevant institutions and education authorities (Cross and Adam, 2007). Sharma (2003) explains that the political powers of any nations affect the introduction of any new technology. Sharma (2003),Amutabi and Oketch (2003) explain that cost is an important issue that decides and guides the adoption and growth of Information and Communication Technology especially in developing countries. Ozdemir and Abrevaya (2007) mention that the institutions, which are granted public status and are supported by government funds, as well as those, that are larger in size, are the ones to adopt the new technologies to support education. However, it is also observed that since technology adoption involves high fixed costs, institutes, which implemented such technology, did not upgrade it as time progressed. The presence of an ICT champion is necessary at all levels of the system. The strong presence of such leadership is evident wherever ICT integration has been initiated successfully (Mason, 2000). Along with ICT training, one needs an ICT related support mechanism to gradually induce the integration (Lai and Pratt, 2004). This is needed as many teachers in face of technical difficulties may tend to revert to the older teaching (non-ICT based) methods. Teachers need support in using and integrating ICT into the curriculum and teaching methods (Lai and Pratt, 2004; Amutabi and Oketch, 2003; McGorry, 2002). Teachers, who perceive greater ICT-related support being available to them, use technologies in their teaching much better (Tondeur, Keer, Braak and Valcke, 2007).

## Challenges of ICT Policy in Higher Education

Countries everywhere are facing similar challenges in implementing ICT policy in their higher education systems. Unfortunately, many local, national and regional government bodies are still not giving ICTs the attention and priority it deserves despite the benefits it brings. Providing basic access to ICT to young people living in either impoverished communities or rural locations often neglected by policy makers is one major challenge being faced. These areas oftentimes lack basic infrastructure such as classrooms, let alone Internet connectivity. Bringing long-term, sustainable ICT policy reform will also be costly and will challenge policymakers handling national budget allocations to make difficult decisions in how to allocate national monetary resources and foreign aid. How these many challenges are being addressed, since learning from the experiences is necessary for policymakers hoping to successfully implement ICT policy in the future.

- **Providing Access to ICT:** Today, citizens in many countries share a common problem in that they have been left behind when it comes to ICT connectivity, and have become part of a digital divide. This gap exists where people have been divided by ICT in one way or another, but mostly between those in the middle and upper classes, and those who live below the poverty line or in rural areas. By bridging the gap between the various groups, countries can make significant progress in eliminating the social and economic inequalities that are detrimental for sustainable development.
- **Teachers and ICT:** ICT can improve the quality of education and heighten teaching efficiency through pre-service training and programs that are relevant and responsive to the needs of the higher education system. This will allow teachers to have sufficient subject knowledge, a repertoire of teaching methodologies and strategies, professional development for lifelong learning. These programs will expose them to new modern channels of information, and will develop self-guided learning materials, placing more focus on learning rather than teaching. However, it is important to point out that ICT is used to enhance teaching styles, and should not replace the role of the teacher. ICT helps create structured and systematic teaching as well as better institutions manage and organization of ICT usage. Teachers should be provided with adequate and appropriate support in their classrooms, and be guided by professional standards that integrate a code of conduct.
- **High Costs and Difficulties in the Transition to ICTs Policy:** Due to the high costs associated with ICT, investments must be carefully planned, finding creative ways of financing, and creating networks and synergies. Strong, sustainable partnerships between the government, private sector and civil society must be built to offset costs and mitigate the complexities of the integration of ICT policy in higher education system. Good will, dedication and flexibility are necessary from all partners to ensure agreement and progress. Another critical issue with the integration of ICT policy is the implementation of new technologies without having analyzed their appropriateness, applicability and impact on various environments and contexts. In most countries, particularly the least developed ones, they must learn from the experiences of others, but must also use technology to respond to their own needs and not just follow

trends. It is necessary to focus on training teachers and instructors to use ICT policy to develop their own teaching materials and educational content. Considering that a majority of the online content available is in English, teachers and instructors, as well as outside developers need to make a meaningful effort to develop learning materials in local languages with appropriate and relevant content for local situations.

- **Government Cooperation and Policy Implementation:** Another challenge that has emerged is the lack of cooperation and coordination between national government policies and the use of ICT policy in higher educational system. Many government ministries lack necessary ICT specialists, such as technicians, programmers, engineers and computer scientists. Those who are available may not understand or are ill-trained to undertake policy and strategic planning for the inclusion of learning purposes within an educational setting. Aside from the lack of staff, there are issues with not having the right tools and institutional infrastructure to address technology and educational issues dealing with learning and teaching. Government cooperation is necessary for ICT programs to be sustainable. Its cooperation is needed in order to support the education curriculum system, which is vital for the survival of ICT. In the attempt to re-evaluate the education curriculum of countries to include ICT, governments also have to consider the social context in which they are implementing this new phenomenon. The realities of individual countries should be considered and the availability of ICT should be made according to the needs and desires of the countries in order to facilitate appropriate learning and local ownership of knowledge.

Although ICT offers a lot of benefits; there are also some risks of using ICT in education which have to be mitigated through proper mechanisms. They are:

- It can affect the bonding process between the teacher and the student as ICT becomes a communication tool rather than face to face conversation and thus the transactional distance is increased.
- It may create a digital divide within class as students who are more familiar with ICT will reap more benefits and learn faster than those who are not as technology savvy.
- It may shift the attention from the primary goal of the learning process to developing ICT skills, which is the secondary goal.
- .The potential of plagiarism is high as student can copy information rather than learning and developing their own skills.
- Also since not all teachers are experts with ICT they may be lax in updating the course content online which can slow down the learning among students.
- The cost of hardware and software can be very high.

## Further Recommendations for Implementation of ICT Policy in Higher Education for Development

Following recommendations are intended for all stakeholders involved in bringing ICTs to countries around the world, will provide a roadmap for long term success in bringing ICTs to students around the world. A key to success is to adopt a comprehensive, end-to-end, systematic approach, with a phased and learn-as-you-go implementation that can be adjusted to adapt to the specific needs and a changing environment.

## For Access

- Special consideration should be given to ICT connectivity and accessibility for educational purposes. Bandwidth and spectrum of radio and television wavelengths should be allocated for education. Planning for connectivity infrastructure and regulations should promote and facilitate educational use of ICT.
- The trends towards convergence and new mobile platforms for internet-connectivity need to be fully exploited through innovative policies and partnerships that can help lower cost and expand access.

- Central and regional digital libraries and resource centers should be developed which can serve institutions in their respective regions. Access to international library resources, research databases, and journals should be arranged for the regional resource centers on behalf of institutions in the region.
- Regional networks of collaboration among countries where language and cultural context are similar could serve as a platform to promote educational quality and equality in an effort to bridge the digital divide. Greater exchange and collaboration in the production and management of educational resources would lower expenses in the development of materials as well as increase the amount of educational content available to teachers and students across the region.
- Public and Private sector education stakeholders must continue to explore the applications of mobile technology in the education sector. It is essential that the ongoing proliferation of mobile devices throughout the developing world collaborates with the education sector to effectively put to good use the mobile phones that so many young students in developing countries have today.

## For Teachers

It is necessary to focus on training teachers and instructors to use ICT to develop their own teaching support materials. This approach assures ownership by teachers and instructors and enhances the usability of products. Many projects still focus on using materials for teachers and students that have been developed externally. However, such materials often fall short of providing appropriate or relevant content for the local situation.

- Teachers should work together with both public and private sector stakeholders to establish networks that support them in their transition to ICT-based education. Online knowledge sharing networks to facilitate this process need to be established for use by teachers at all levels

## For Cost

- Any initiative, be it from government, private sector or civil society, should make lobbying for more investments in computers a priority. Insufficient access to computers is one of the main obstacles in ICT for education programs. Although this will require massive investments in the infrastructure, it is nevertheless essential in order to guarantee equal access and overcome the digital divide.
- International agencies such as the UNDP, the World Bank, among others, should work together along with the local governments of grant-receiving countries to establish a global framework to deal with emerging issues of the digital divide due to the new Internet economy.
  IT companies from developed countries such as the U.S. should work with local organizations, including universities, government agencies, community service organizations, nonprofits, and small businesses, to implement and train local people in new technologies, and help in implementation through innovative partnerships that can harness complementary resources and technology solutions to overcome obstacles.

**For Government and Policy Implementation**

- Sustainable partnerships between the government, private sector and civil society must be built to offset costs and mitigate the complexities of the integration of ICT in education. Good will, dedication and flexibility are necessary from all partners to ensure agreement and progress. Due to high costs, investment made must be strategic after careful planning, finding creative ways of financing, and creating networks and synergies.
- A coherent national policy on ICT in education is a necessity in order for successful ICT integration and capacity building. Governments must demonstrate political will and must champion the integration of ICTs to improve higher education and training in line with national development goals and frameworks. Government involvement is critical to source additional investments in ICT infrastructure, to integrate ICT policy in the curriculum, and to facilitate the widespread diffusion of materials.

**For Monitoring and Evaluation**

- Stakeholders working on ICT policy implementation at all levels must closely monitor the progress of their projects to ensure that they are progressing and sustainable.

## Conclusion

The overall literature suggests that successful ICT integration depends on many factors. National policies as well as university policies and actions taken have a deep impact on the same. Similarly, there needs to be an ICT plan, support and training to all the stakeholders involved in the integration. There needs to be shared vision among the various stakeholders and a collaborative approach should be adopted. Care should be taken to influence the attitudes and beliefs of all the stakeholders.ICT can affect the delivery of higher education and enable wider access to the same. In addition, it will increase flexibility so that learners can access the higher education regardless of time and geographical barriers. It can influence the way students are taught and how they learn. It would enable development of collaborative skills as well as knowledge creation skills. This in turn would better prepare the learners for lifelong learning as well as to join the industry. It can improve the quality of learning and thus contribute to the economy. Similarly wider availability of best practices and best course material in education, which can be shared by means of ICT, can foster better teaching. Changes in the curriculum do support fundamental economic and social transformation in the society. Such transformations require new kinds of skills, capabilities and attitudes, which can be developed by integrating ICT policy in higher education. However there exist some risks and drawbacks with introducing ICT in education which have to be mitigated. Successful implementation of ICT to lead change is more about influencing and empowering teachers and supporting them in their engagement with students in learning rather than acquiring computer skills and obtaining software and equipment. Also proper controls and licensing should be ensured so that accountability, quality assurance, accreditation and consumer protection are taken care of. ICT policy enabled higher education will ultimately lead to the democratization of education.

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