

ICT in Higher Education: Review of Literature from the Period 2004-2011

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Abstract—Information and Communication Technology (ICT) is a vehicle to enhance the quality of the education. As the world is moving rapidly into digital media and information, the role of ICT in education is becoming more important in the 21st century. ICT helps to share availability of best practices and best course material in education. ICT based education causes changes in the educational objectives in the conception of the teaching and learning process. ICT allows the academic Institutions to reach disadvantaged groups and new international educational markets. Within the past decade, the new ICT tools have fundamentally produced significant transformations in industry, agriculture, medicine, business, engineering and other fields. The new teaching methodologies involve the use of audiovisual, computer and telematic tools on the part of lecturers.

Index Terms—ICT, higher education, ICT tools, technology, teaching and learning, ICT policy.

I. INTRODUCTION

Information and Communication Technologies (ICTs) is a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information. This broad definition of ICT includes technologies as radio, television, video, DVD, telephone, satellite systems, computer and network hardware and software; as well as the equipment and services associated with these technologies, such as videoconferencing and electronic mail (UNESCO, 2002). ICT is potentially a powerful tool for extending educational opportunities and can provide remote learning resources. ICT encourage students to take responsibility for their own learning and offers problem centered and inquiry based learning which provides easy access and information based resources. It is necessary to acquire the ability to use technology as a tool to research, organize, evaluate and communicate information and the possession of the fundamental understanding of the ethical or legal issues and use of information [1]. Today knowledge of networking, communication and retrieval technologies has become core to the profession.

Success of ICT-based education depends upon the teacher's ability to keep pace with the developments since teachers are responsible for quality control, improvement of learning and the aggregate effectiveness of the learning process [2]. The main role of teachers will not be to transmit information and culture, but rather to act as experts and leaders to motivate learning. This paper highlights the

implementation of ICT policy in higher education and further explores the impact of ICT in teaching learning process in higher education in different countries within a period of 2004- 2011, followed with benefits and challenges of ICT in higher education.

II. ICT IN HIGHER EDUCATION

The ICT Policy in higher education aims at preparing youth to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socio- economic development of the nation and global competitiveness. The introduction of ICT in the higher education has profound implications for the whole education process ranging from investment to the use of technologies in dealing with key issues of access, equity, management, efficiency, pedagogy and quality [3].

- 1) Student-centered Learning: ICT provides a technology that has the capacity to promote and encourage the transformation of education from a teacher directed enterprise towards student-centered models. As more and more students use computers as information sources and cognitive tools, the influence of the technology will increase to support their studies [4, 5, 6, and 23].
- 2) Supporting Knowledge Construction: Learning approaches using contemporary ICTs provide many opportunities for constructivist learning and support for resource-based, student centered settings by enabling learning to be related to context and to practice.
- 3) Anyplace Learning: With the help of ICT, educational institutions can offer programs at a distance mode. Today many students can use this facility through technology-facilitated learning settings.
- 4) Anytime Learning: Technology-facilitated educational programs remove the geographical barriers. Students are able to undertake education anywhere, anytime and at any place. This flexibility has provided learning opportunities for many more learners who previously were constrained by other commitments.
- 5) Information Literacy: The growing use of ICT as tools of every day life have seen the pool of generic skills expanded in recent years to include information literacy. It is highly probable that due to the future developments and growth in technology, it will help further for information literacy.

III. RELATED WORK

In this section review of literature is made from the period

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of 2004 to 2011 from different countries about the usage of ICT in higher education and then critical analysis is done.

In the paper *Integration of ICT in Higher education Institutions : Challenges and best practice recommendations* based on the experience of Makerere University and other organizations [7] states that information infrastructure of African Higher Education is poorly developed and unevenly distributed. The major challenges faced are lack of awareness and mindset, lack of top-level commitment for the progress in ICT integration, a systematic method of ICT implementation, cost of bandwidth and efficient utilization of ICT. To resolve these challenges, it is necessary to define well planned ICT policy for successful mobilization of funds. Despite these difficulties, a number of Higher Education Institutions in Africa have made significant progress in building an ICT infrastructure and developing computer science and other ICT disciplines. Jef Peeraer [8] throws a light on factors influencing Integration of ICT in teaching practice in Teacher Education Institution in higher Education in Vietnam. The important factors for successful implementation of ICT in teaching-learning are ICT skills, confidence to use computer, infrastructure and availability in hardware and software. He further mentioned barriers for the usage of ICT like lack of technical support, insufficient knowledge, gender and age of teacher and lack of motivation. Author states that enthusiastic nature of teacher towards the usage of ICT, ICT policies, budget, educational management and skill training plays an important role in the integration process of ICT.

Through the work Mee Chin Wee [9] presented the obstacles towards the use of ICT Tools in Teaching and Learning of Information Systems in Malaysian Universities. The most significant obstacles are fast change in ICT tools, extra time and effort needed to integrate ICT tools in teaching, poor network connectivity, improper evaluation in integration of ICT tools in teaching etc. He further stated that it is necessary to remove these obstacles for successful implementation of ICT in higher education. Carla Teixeira Lopes [10] prepare a model to evaluate the e-learning readiness in Porto's Allied Health Sciences Higher Education Institution which highlighted the importance of usage of ICT for medical students and faculties for teaching-learning purpose.

Alireza Abbasi [11] highlighted about the ICT status and development strategy plan in Iran. A review report states that Iran needs to base its national information and communication technology strategy on a much greater consideration of local, cultural and social issues. The national IT strategy will need to address the issues of resistance to change due to cultural, personal and infrastructural factors. The government has a major role to play if the country wants to stand in the information arena like regulator, promoter and diffuser for successful implementation of ICT in higher education. Markus Mostert [12] has given reflections about usage of ICT in Teaching and Learning on Professional Development of academic Staff in South Africa. He further mentioned that in South Africa, there is a need in professional development for lecturers to use ICT in teaching and learning. Since technology has revolutionized teaching and learning method and academic staff members face the challenge of introducing effective ways of engaging technology.

In the paper *ICT in Indian Universities and Colleges*, Snehi Neeru [13] indicates transformation of higher education in the country in terms of access, equity and quality due to usage of ICT in education. In this regard the opportunities and challenges posed by integration of ICTs in various aspects of higher education in the present scenario are discussed. Also the factors regarding future development in ICT in education sector are also highlighted. Patrick Shabya [14] highlights the changing role of ICT for delivery of instructions in Higher Education Institutions in Kenya. Research has shown that ICT explore and simulate abstract concepts while encouraging self learning, ability to address complex problems, encouraging team work and allow for critical thinking. Author also highlighted the factors on the changing trends in usage of ICT for instruction in Higher Education Institutions. Mahmoud Abu Qudais [15] identified the main factors which affect the attitudes of senior faculty members in Jordanian Universities towards using ICT in their teaching activities. Factors identified are lack of motivation to use ICT in teaching - learning purpose, lack of technical skills, insufficient availability of hardware and software, inadequate infrastructure etc. and it is necessary to remove these barriers. He further stated that to succeed utilizing technology in a pedagogically meaningful way, there must be reorganizations in different levels like individual actions, attitudes and at pedagogical levels.

Allah Nawaz et al. [16] highlights demographic implications for the user-perceptions of e-learning in higher education Institutions of n-w.f. p, Pakistan. The factors highlighted are age, gender, qualification, perceptions, experience and organizational characteristics which plays an important part in implementation of ICT in teaching-learning purpose. Further elearning efforts are reported to be associated with problems in the construction, use and progress of the eLearning environments in the institutions for teaching, learning and administrative purposes. In the paper, *Application of ICT In Teaching And Learning at University Level: The Case Of Shahid Beheshti University*, highlighted the importance of ICT support in teaching, learning and research activities in higher education. This research is concentrated on the obstacles, facilitators, and the risks of using these technologies in teaching and learning in higher education. [17]. In the paper *developing elearning materials for the software development course*, author highlight the project work related to the factors on the development of elearning materials for software development course. The project intended to provide a learning context in which learners can reflect on new material, discuss their tentative understandings with others, actively search for new information, develop skills in communication and collaboration, and build conceptual connections to their existing knowledge base [18].

R. Krishnavani [19] highlighted the usage of ICT for Administration in Higher Education Institutions in terms of general administration, payroll and financial accounting, administration of students data, personnel records maintenance and library system. The various factors that contribute to these functional areas were identified and a theoretical model is developed. In the paper *ICT use by Journalism Professor in Colombia*, author makes analysis

about the usage of ICT by journalism professors at Colombian universities. Factors that influence the teaching are uses of ICT and the implementation of pedagogical strategies in the classroom. To support ICT in teaching, pedagogical model is implemented related to new teaching-learning opportunities in the classrooms at Colombian universities [20]. The paper Study of satisfaction and usability of the Internet on student's performance, throws the light to examine satisfaction and usability of internet usage on students' assignment completion tasks and their performance and prepared extended task technology fit model to consider technology resistance and technology usage factors. Author further indicate that technology satisfaction and the internet usage significantly explains the variance on students' performance [21]. In the paper Challenges of e- Learning in Nigerian University Education Based on the Experience of Developed Countries", author highlighted the importance of governments role to increase funds for education in order to face challenges of e-learning in Nigerian university education and explore the strategy to increase training, motivation and awareness programs for successful implementation of e-learning in higher education. [22].

The Table I show efforts made for the successful implementation of ICT in higher education in different countries from the period 2004-2011.

IV. FINDINGS

From the above discussion, it is clear that use of ICT for education is a horizontal activity that requires elements from different verticals to come together to enable meaningful learning experiences for the students. The following major aspects need to be addressed in a Policy for ICT in Education:

- 1) Content/Digital Resources
- 2) Capacity Building
- 3) Monitoring and Evaluation Framework
- 4) ICT for Education Management
- 5) Implementation Plans
- 6) Financial Allocations
- 7) Political and Administrative support
- 8) Community Demand for ICT
- 9) Adapting a change in learning Processes
- 10) Staff Development and Training Programmes

V. BENEFITS AND CHALLENGES OF ICT

ICT provides student support services such as course outlines, digitally recorded classroom material, discussion groups, laboratory manuals and lab assignments, lecture notes, live lectures for later viewing and re-viewing, links to course specific websites, online tutorials, supplementary readings, and virtual office hours for teacher-student consultations. Virtual libraries are a particular boon to students as they cut down on costs of acquiring expensive textbooks, journals and reference material. Tools are available on the Internet to assist both teachers and students to manage writing assignments to detect and avoid the pitfalls

TABLE I: SUMMARY OF ICT INTEGRATION IN DIFFERENT COUNTRIES

Author	Title	Country
F.F.Tusbira, N Mulira [2004]	Integration of ICT in Higher education Institutions:Challenges and best practice recommendations based on the experience of Makerere University and other organisations.	Africa
Jef Peeraer, Peter Van Petegem [2005]	Factors Influencing Integration of ICT in Higher Education in Vietnam.	Vietnam
Mee Chin Wee, Zaitum Abu Bakar [2006]	Obstacles Towards the use of ICT Tools in Teaching and Learning of Information Systems in Malaysian Universities	Malaysia
Carla Teixeira Lopes [2007]	Evaluating E-Learning Readiness In A Health Science Higher Education Institution,	Porto
Alireza Abbasi , Abolghasem Sadeghi Niaraki , Behzad Mirzaeian dhko [2008]	A Review of ICT Status and Development Strategy Plan in Iran	Iran
Alireza Abbasi , Abolghasem Sadeghi Niaraki , Behzad Mirzaeian dhko [2008]	A Review of ICT Status and Development Strategy Plan in Iran	Iran
Markus Mostert, Lynn Quinn [2009]	Using ICTs in Teaching and Learning: Reflections on Professional Development of Academic Staff in South Africa.	South Africa
Snehi Neeru [2009]	ICT in Indian Universities and Colleges. Management and Change	India
Patrick Shabya [2009]	The changing role of Information and Communication Technologies (ICTs) for Instruction in Higher Education Institutions in Kenya	Kenya
Mahmoud Abu Qudais, Mosleh AI-Adhlesh, Aieman AL-Omen [2010]	Senior Faculty Members Attitudes in Jordanian Universities towards using Information and Communication Technology	Jordan
Allah Nawaz, Ghulam Muhammad Kundi [2010]	Demographic implications for the user-perceptions of e-learning in higher education institutions of n-w.f.p, pakistan	Pakistan
Kourosh Fathi Vajargah , Sheida Jahani , Nahid Azadmanesh [2010]	Application of ICT In Teaching And Learning At University Level: The Case Of Shahid Beheshti University,	Iran
Hao Shi, [2010]	Developing elearning materials for software development course	Australia
Krishnaveni , J. Meenakumari[2010]	Usage of ICT for Information Administration in Higher Education Institutions-A Study	India
Elias Said Hung [2010]	ICT use by Journalism Professors in Colombia	Colombia
Ela Goyal , Seema Purohit , Manju Bhaga [2011]	Study of satisfaction and usability of the Internet on student's performance	India
N.D. Oye1, Mazleena Salleh2, N. A. Iahad [2011]	Challenges Of E-Learning InNigerian University Education Based on the Experience of Developed Countries	Africa

of plagiarism and copyright violations. ICT improve the quality and the quantity of educational provision. Introducing ICT systems for teaching in developing countries has to consider about high opportunity cost of installation, investments in hardware and software's and in human skills and training. Technology-facilitated learning has proven to be quite expensive in all areas of consideration, infrastructure, course development and course delivery.

VI. CONCLUSION

Integration of ICT in higher education is inevitable. In the coming years the thrust will be on the use of ICT to strengthen the system in the mode of opens and distance learning. Institutional and sector-wide higher education ICT policy and planning should identify the specific role of ICT in enhancing research capabilities and provide for adequate infrastructure backed by capacity building. Digital libraries, access to online databases, networking etc. can be enhanced through inter-institutional collaboration to ensure optimal usage of ICT expertise and resources. EDUSAT and DTH will be promoted, wherever feasible, to enhance access to information and resources. A broadcast Server for digital storage, retrieval and transmission of broadcast quality educational audio-video programmes will be deployed. Digital libraries, access to online databases, networking, etc., can be enhanced through inter-institutional collaboration to ensure optimal usage of ICT expertise and resources. The wide adoption of ICT calls for mindsets and skill sets that are adaptive to change.

Though higher education institutes in developed countries have policies on the generative role, there are controversies about balancing long-term academic research with short-term technology transfer projects. Institutional and sector-wide higher education ICT policy and planning should identify the specific role of ICT in enhancing research capabilities and provide for adequate infrastructure backed by capacity building. Teacher has to adapt continuous professional development in the educational uses of technology. In this sense, teachers have to be ready to make use of the possibilities that ICT offer, such as different learning contexts, focused on the students, presenting them with several types of interaction, offering different degrees of control of their own learning, adapting to their personal interests, promoting collaborative tasks and developing autonomy in their work and study .

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