ADVANTAGES AND CHALLENGES OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) AND KNOWLEDGE MANAGEMENT (KM) IN HIGHER EDUCATION: AN OVERVIEW

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Abstract

Investigation was carried out through e-survey and library consultation. Study dealt with role, advantage and challenges of Information Communication Technology (ICT) in higher education and ICT and knowledge management (KM). The critical review of research literatures suggested diversified views and definitions of the knowledge lead to different conceptualization of KM and ICT in higher education in Indian context. KM processed knowledge acquisition, creation, storage and application while information followed the socialization, externalization; internalization in ICT integrated mode to assure long lasting value of higher education for qualitative knowledge based (K-based) economy. This may help in building competitive advantage, internationalization and intellectualization improving quality, efficiency and effectiveness in higher education for economic and social development of the Nation. Considering its importance during past two decades efforts have been made to investigate the relevant aspects, but published literatures on the above subjects are mostly theory based conceptual and/or review oriented papers. It lacks empirical database researches and most of the available investigations on ICT, Knowledge Management (KM), ICT and KM in higher education pertain to abroad. Even theory based conceptualized publications and review papers on the above aspects in Indian context are scanty and scattered. In view of its importance for

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improving k-based National economy through cost-effective ICT based KM globally, it seems worthy to investigate comprehensively in order to create and analyze the perceptual data base that would lead to policy advocacy for improving ICT and KM in higher education of the country and accelerating the ever growing digital talents for cost effective National economy.

Keywords: ICT, Knowledge management, Higher Education, Globalization,Knowledge based Economy

Introduction

Indian higher education institutions/universities are complex. In an era of K-based society country's holistic development may be obtained using most recent innovative technological tools (Jonson, 2012). The universities have to produce graduates, post graduates and research scholars of quality to build a k-based society (Mohayidin et al., 2007). However, their challenges of crowdedness, emergence of greater accountability, globalization of the knowledge economy, commercialization and advances in ICT are identical. In a changing education it has compelled them to adopt client oriented sustainable educational institutes (Till, 2003). The higher education reform could not take off without ICT. (Lishan Adam, 2003). Currently students are transformed into a "Net-Generation" (Tapscott, 1998). They learn information quickly with multi-tasking information access. While learners have low tolerance of lectures; rely on ICT and becoming more mobile. With the time, educational systems have to be modified in accordance to new needs and changes of people, society, and economy. (Adil Laoufi et al., 2011). This requires higher education reforms in India by developing new models of its intellectual capital using ICT (Tapscott, 1998). Because, in the existence of those elements university functions normally to promote better knowledge communication (Adil Laoufi et al., 2011).

In digital society of today there is an increasing trend of lifelong learners. To keep pace in recent developments, they integrate new knowledge with ICT (Plomp et al., 2007). Hence, the higher education becomes more important for increasing new ideas, productive skills, social interaction, employment and earning power (Kozma, 2005). The various kinds of ICT have relevance to education (Sanyal, 2001; Sharma, 2003; Bhattacharya and Sharma, 2007) in diversified ways and means (Kozma, 2005). ICT can play vital role in strengthening research, service to the

community and teaching to meet the higher education mission (Balasubramanian et al., 2009). In era of fast change in higher education with the integration of ICT the Nation can built talented society in order to enhanced growth. There is steady and expanding demand of ICT for higher education in developing countries for cost effective improvement of quality education. In education circles, ICT can be used for working more in less time for teachers and students in providing quality as well as quantitative educational contents (Lishan Adam, 2003; Neeru Snehi, 2009). Of late, the students are digital natives. Their approaches in using various ICT tools are different. The teachers are digital immigrants. They have to understand the recent ICT and KM for better impart of knowledge for learners of digital natives.

Satellite Instructional Television Experiment (SITE) is developed in 1975-76 (Neeru Snehi, 2009) for school oriented programs production and transmission. As nodal agency UGC has created Educational Media Resource Centers (EMRCs) and Audio-Visual Resource Centers (AVRCs) in many universities with ICT use for increasing access to quality education. Country has launched a satellite EDUSAT to promote ICT driven open and distance education in quantitative and qualitative learning (Neeru Snehi, 2009). In this regard Bhatia, (2009) states that only quantitative expansion is achieved and qualitative revolution yet to be achieved. In higher education e-teaching and e-learning is prompted with the transmission of e-content. However, there is challenge of generating and transforming e-content for e-learning for imparting teaching and conducting research (Lishan Adam, 2003). According to Mohayidin et al. (2007), the computer-based technology communications complement traditional storage and delivery methods and improve knowledge delivery efficiency.

Considering ICT significance and KM in higher education, attention of various investigators has been attracted towards the role of ICT on the different aspects of higher education such as on ICT's role, advantages and challenges, KM in integrating ICT in higher education etc either in isolation or in combination of different aspects. However, most of the literatures are on the concept and review papers and that too foreign country based research. In Indian condition publications are scattered and scanty. The present investigation is an overview on the roles and advantages of ICT and KM in higher education. It would be useful to policy makers, planners,

higher education institutions, researchers, teachers, scholars and students in more than one ways in improving higher education to strengthen knowledge based national economy.

Methods

Study was carried out during 2012-13 at ICT Cell, KIIT University Bhubaneswar, India. Relevant information was gathered through e-survey of literatures published during last two decades and the resources available at Library of KIIT University, Bhubaneswar, Odisha. Publications were categorized into:

i) Role of Information Communication Technology (ICT) in higher education ,

ii) Advantages of ICT integration in higher education,

iii) ICT challenges in higher education and

iv) ICT and KM in higher education

Category wise papers were reviewed, analyzed and compiled briefly to generate further researchable issues in the field of Information Communication Technology (ICT) and Knowledge Management (KM) for improving higher education in the country.

Results and discussion

Roles of ICT in higher education:

As per Blurton (2002) ICT may be defined as "various set of tools of technology along with diversified resources in order to communicate, create, disseminate, store, and manage information". Different investigators have expressed variable roles of ICT. Mlitwa (2007) links these terms to ICT knowledge. As a tool ICT has to advance knowledge. ICT tool enhances problem solving capabilities of man. With the help of ICT tool students acquire knowledge. It helps teachers to accelerate teaching and learning. Uses of ICT in higher education reduce costs (Ozdemir and Abrevaya, 2007). According to Ozdemir and Abrevaya, (2007) ICT provides affordable and accessible higher education whereas, Fluck, (2003) Thune and Welle-Strand (2005) and Ozdemir and Abrevaya (2007) point out its role in increasing enrolments. Thune and Welle-Strand (2005) opines that ICT increases student mobility. ICT also meet the needs of off-shore learners (Bhattacharya and Sharma, 2007). It effects the modus of course operand in teaching and learning (Thune and Welle-Strand, 2005; Casal, 2007; Mooij, 2007; Ozdemir and Abrevaya, 2007). It gives superior quality skills and collaboration (Bhattacharya and Sharma,

2007). It increase program flexibility (Oliver, 2002) and generate competition among institutions for need based improvements (Lim and Hang, 2003, Kozma, 2005; Ozdemir and Abrevaya, 2007).

International Association of Universities (1998) and Thune and Welle-Strand (2005) express that ICT plays an important role in tackling accelerated crowdedness, diversification, internationalization and marketing issues in advanced studies. ICT use changes the mode of businesses management. It also affects the work, interaction and function of people in society (Bhattacharya and Sharma, 2007; UNESCO, 2002). McGorry (2002) and Kirkup and Kirkwood (2005) suggest that ICT is very common everywhere starting from home to work place and internet use is increased significantly. Globally many nations depend on ICT to tackle various issues of higher education. This drives the national economy (Mehta and Kalra, 2006). There is an increasing demand of competent human capital to mitigate the economic crisis (Purwadi, 2001). Postiglione (2009) states that in some country higher education serves knowledge and human capital repositories in order to overcome the various issues.

ICT is used everywhere within higher education in order to improve teaching and learning to promote research, engage talented scholars and administration as opined by Balasubramaniam et al (2009) and Jaffer et al (2007). Researchers refer ICT use in higher education as educational technologies (Czerniewicz et al., 2005). It is used as learning technology in e-learning online teaching (Van der Merge and Moeller, 2004) and e-learning contents (Smith, 2004). It is used as communication technology (Blanchette and Kanuka, 1999). ICT is also utilized for web-based learning (Czerniewicz et al., 2005), hybrid learning (Thune and Welle-Strand, 2005) and virtual learning environments (Kirkup and Kirkwood, 2005).

In general universities emphasize on course content centering the textbooks. Education is imparted by giving lectures, tuition and assignments (Oliver, 2002). But, in modern pedagogical education with integration of ICT encourage curricula by increasing competency and performance. Traditionally, learning is student-centered whereas, students have to have confidence in communicating, interrelating, reflecting and resolution etc (Forde, 2007). ICT integration in education results shift from faculty-centered information communication to learner-centered responsible knowledge gain (Hattangdi and Ghosh, 2005). In digital era the

learning is increasingly inquiry-based and problem-centered. Teachers work as facilitators, coaches and mentors with the support of ICT (Oliver, 2002). ICT creates the learning environment to move beyond behaviorist learning theories. In constructivist hypothesizes the learning is completed through active knowledge construction (Duffy and Cunningham, 1996). Under this learning the social interactions are very important (Vygotsky, 1978). Here the students gain appropriate knowledge and generic skills. With the growing use of ICT the graduates need to have information literacy. According to McCausland et al, (1999) information literacy is the ability of identifying the relevant issues followed by identification, locating, analyzing and evaluating required information to mitigate the issue and challenges.

Traditionally, learners require completing their tasks within a specified time-frame and settings. Students hardly put any question on the programs and its delivery. But in digital era, the higher education is offering flexible choices need-based quality learning (Moore and Kearsley, 1996). Now ICT is playing a significant role in distance education programs for higher education. Higher education e-learning is not confined to schedules and time tables and facilitates the participation of large number of learners without time constraints (Hattangdi and Ghosh, 2008). ICT use in higher education encourages learning through work experience (UNESCO, 2002). In this type of learning, students enable access to contents and courses with the help of ICT at their workplace on a need basis.

During last two decades ICT develop very fast. This brought large changes in different industries and influenced the methods of interaction and work of man in society (UNESCO, 2002; Bhattacharya and Sharma, 2007; Chandra and Patkar, 2007). ICT may mitigate the constraints of poor quality education at national level. ICT tools may also mitigate the problems of high capital, inadequate teachers, low quality education, time and distance barriers (McGorry, 2002). High proportion of Indian population (over 1.25 billion) is young. They need to be educated using modern ICT tools in order to bridge the gap (Amutabi and Oketch, 2003). Innovative use of ICT can potentially solve the problems.

Advantages of ICT integration in Higher Education:

In generation of digital resources (digital library) the ICT play a crucial role. This is easily accessible to learners and teachers for research-and course-materials (Cholin, 2005; Bhattacharya and Sharma, 2007). IT allows networking for sharing scholarly materials by avoiding work duplicity (Cholin, 2005). In higher education ICT provides quality skills so as to solve complex problem through all round collaboration (Mason, 2000; Lim and Hang, 2003; Bottino, 2003; Bhattacharya and Sharma, 2007). It improves the student's knowledge perception throughout the world. From the above accounts it may be pointed out that for preparing digital workforce for improving global economy the ICT plays a crucial role (Kozma, 2005).

ICT based learning is advantageous for eliminating time barriers as well as geographical barriers in education for learners and teacher (Sanyal, 2001; UNESCO, 2002; Mooij, 2007; Cross and Adam, 2007; Bhattacharya and Sharma, 2007). A synchronized teaching and learning process in higher education is completed by thoughtful creative interactions (Sanyal, 2001; UNESCO, 2002; Bhattacharya and Sharma, 2007). With the use of ICT Increased collaboration becomes possible (Sanyal, 2001; Plomp et al., 2007; Bhattacharya and Sharma, 2007). An innovative approach using ICT may be used for enhancing quality and standard of higher education (Sanyal, 2001) for providing rapid transfer to the target groups (UNESCO, 2002; Chandra and Patkar, 2007). As per UNESCO (2002) and Bhattacharya and Sharma (2007) ICT can provide education combination maintaining balance in work life. An international dimension of educational service can be increased in time for non formal education (UNESCO, 2002). Higher participation and interaction is possible through e-learning in higher education. Over the internet, e-learning facilitates the delivery, dialogue and feedback. It also allows ease of access to need base modification of content and exams. Wishart et al. (2007) suggest that teaching methods like role-become easy in on line environment across time and distance through ICT use.

Web and Internet is the core ICT in e-learning for spreading education. In higher education digital identity of the students is created. It connects all the stakeholders and allows inter-disciplinary investigation as suggested by Chandra and Patkar (2007). Plomp et al (2007) point out that ICT utilization is motivating students and teachers whereas; Bottino (2003) and Sharma (2003) suggest that teaching performances are improved by using ICT. It facilitates learning through work experiences (Yuen et al, 2003). According to Casal (2007) ICT provides a platform

for sharing information and knowledge which hold great promise for future (Mason, 2000; Casal, 2007). ICT helps in increasing human as well as knowledge capital. For the development of society ICT tools play very crucial role (Casal, 2007). It may helpful in pedagogical, curricular and assessment reforms. By using ICT tools the faculty members and learners plan learning activities and take benefits from each other by idea interaction to create new knowledge. ICT enables the progress monitoring the societal knowledge information (Kozma, 2005; Bhattacharya and Sharma, 2007).

Use of ICT is cost effective for the students by reducing travel expenses. It tackles problems of more number of students (Fluck, 2003). As per Mooij (2007) the ICT provides higher reliability, more validity and greater efficiency. With the ICT use, the responsibilities may be transferred to students for self management which help individualize need-based teaching or guidance method (Mooij, 2007; Ozdemir and Abrevaya, 2007). According to Mooij (2007) different levels of information and educational setup can be linked with the help of registration, evaluation and administration through ICT application. ICT may offer education in the form of service (Bhattacharya and Sharma, 2007). It enhances mass e-learning as well as creates institutional competition in order to provide quality education (Cross and Adam, 2007).

ICT challenges in higher education:

Fast ICT growth and its use in higher education system face many challenges. Few challenges of ICT in higher education may emerge by asking the following questions. What are the course-contents and programs students have to learn, what are methods of learning, what is time when they learn, which are the places where learners learn, who are the new learners and teachers and how learning can be made cost effective? The research-based knowledge on the techniques of ICT use for improving the models, impart of knowledge and higher education management are readily not available. In the application of ICT in higher education the different states of India are at different stages of development. It is one of the major constraints to maintain uniformity in ICT utilization. The higher education systems have inadequate funds for maintaining quality education and preserving teachers to meet the satisfactory social needs (Boeren and Maltha, 2005; Lee and Healy, 2006). Ever increasing enrolment of the students, new knowledge emergence, ICT advancement, globalization, economic restructuring, financial constraints etc,

contribute in reforming higher education (Hattangdi and Ghosh, 2008; Shin and Harman, 2009; Welch, 2011).

Increased access of graduate and post graduate students results massiveness in higher education and this is one of the crucial factors for global higher education development (Altbach, 1999). Higher education systems are also influenced with it (Lee and Healy, 2006; Welch, 2011). Bates (2001) suggests that k-based economy demands "technology-ready workers". Due to use of ICT in routine tasks, there is an enormous pressure on educational institutions to produce ICT workers by the governments and business communities. However, Mumcu et al. (2004); Ojo et al. (2007); Isman, et al., (2010), opine that on work-place there is inadequacy of ICT infrastructure which is one of the major limitations in using ICT because a robust ICT infrastructure is prerequisite in higher education for k-driven development. With the development of new technologies, the higher education systems must be advanced in knowledge and skills. It is very important that universities in region should be equipped with industry-ready skilled and knowledgeable students for competitive global economy. Though for all the challenges, ICT is not a panacea, but it has positive learning impact (Jaffer,Ng'ambi and Czerniewicz, 2007). Education is prerequisite for the socio-economic advancement of the nation (Mehta and Kalra, 2006). Therefore, for ensuring good quality, easy accessible and affordable higher education, it seems necessary to be innovatively integrated with ICT to produce "technology-ready workers" in the nation (Hattangdi and Ghosh, 2008).

Currently, focus is given to use ICT by faculty members and to impact of ICT use in higher education (Keengwe and Anyanwu 2007). Though ICT is prevailing in education, but it is not intensively used in teaching and learning activities (Grabe and Grabe, 2008). In most of the cases new and complex ICT tools are bought and kept with teachers. Because, there lacks suitable supportive infrastructure for adaptation and integration with KM (Jonson, 2012). Real technology operators are generally engage in inquiry about the technology (Hall and Hord, 1987). Hence, before implementation of ICT device it necessary to conduct pre-assessment to find out organization's proper equipment with supportive infrastructure, human resources and structure to enable technological innovation adoption (Jonson, 2012). Then gap analysis need to be done in order to identify intervention points for ICT integration in KM in higher education.

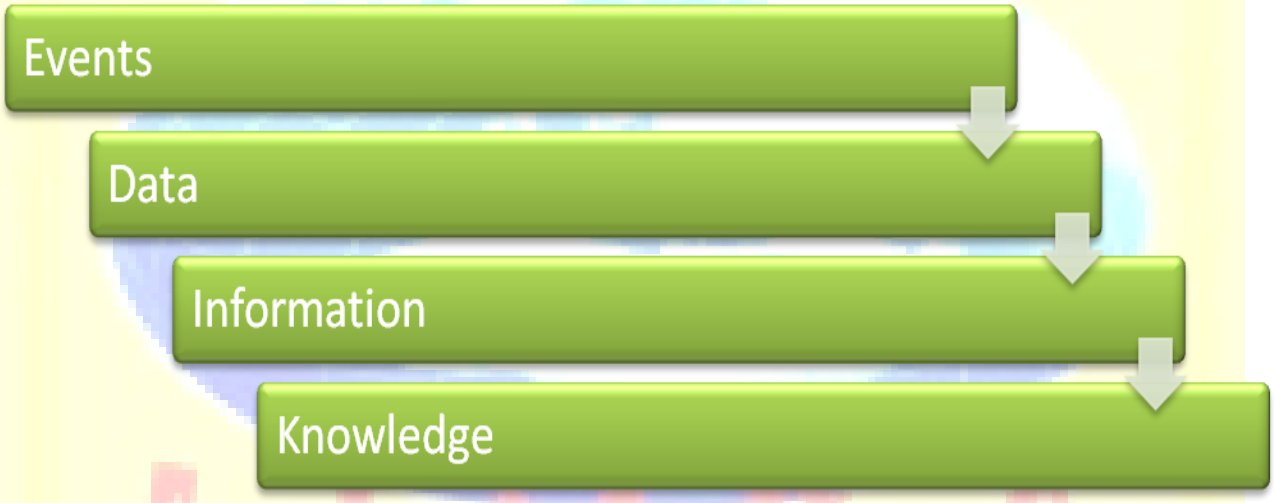
Previously, teachers were not integrating ICT into their practice due to lack of an appropriate training or access to technology (Clarke & Robinson, 2005). Research has shown even when teachers have access to training and technology, they still do not, in any significant numbers, integrate technology into their teaching (Ertmer, 2005; Mueller et al., 2008). This trend has led researchers to consider that low levels of ICT-related change in higher education. Risk theory offers a way to examine these types of cultural interactions, by providing a useful conceptual framework for understanding "why things have gone wrong" (Lupton, 1999); but, risk perceptions are not only about negative results or fears but also it can be in the form of positive exploration, with potentially questionable results. Research findings indicate non availability of skilled workers (Agarwal, 2006). The socio-cultural, socio-economic and geographical limitations are still in existence for learner in higher education (Bhattacharya and Sharma, 2007). Research shows that most of the institutions could not completely full fill the requirements of Generation Y employees with the afforded opportunities by Web 2.0 technologies (Burkinshaw and Pass, 2008). In higher education ICT use for KM is an emerging issue. It needs innovative approach of research to address the emerging issues.

ICT and KM in higher education:

Challenges in ICT integration in higher education need to be addressed through appropriate KM in the educational institutes to improve the quality, efficiency and effectiveness (Hawkins, 2000). It gives solutions for the management, organizational behavior, retrieval of information and artificial intelligence (Adil Laoufi et al., 2011). The University Grants Commission (UGC) maintains quality in Indian higher education institutions. UGC is responsible to maintain teaching, examinations and research standards and quality of colleges and universities. UGC also conducts the National Eligibility Test (NET) for high teaching standards. It is done to improve higher education quality. In this, ICT works as a hub. According to Hameed (2006), Aldridge (2008), Shaikh (2009) and Aypay (2010) ICT has significant role in higher education, over all development, generation of employment, improving economic growth, providing governance and administration, reducing poverty, community engagement, efficient research activities and knowledge society's emergence globally. Many researchers like Ng et al. (2006), Kong and Li. (2009), Shaikh (2009) and Masood (2010) suggest that globalization of knowledge-based

economy are due to individual's ability in information dissemination. For KM process capturing, abstracting, codifying, organizing, storing, diffusing, reusing, transformation words are commonly used. ICT infrastructure and supporting software manages existing explicit knowledge. An event creates data, data generates information and information creates knowledge (Fig.1). Creating knowledge from data signifies a process of extracting information from data and ICT serves as an enabler for transforming knowledge into profitable products. ICT can increase the flow of knowledge offering modern systems and enabling support for sharing knowledge. Whereas, the theories approach method for soft track are people-focused enabling a ''good'' space (Nonaka and Takeuchi (1995) and Sveiby (1997)

Fig.1. Knowledge creation.



As per Holsapple (2005) KM can't be separated from ICT. Some scholars (Boisot, 1998; Leonard and Sensiper, 1998) also tackle specific professional issues in KM point of view by synthesizing hard as well soft aspects. They take KM as an effective integration of human, ICT and processes. Hence Jackson (2005) has created a holism approach to draw complete KM development picture as also suggested by Gao et al. (2003) and Gao and Li. (2003)

According to Shaikh Faheem Gafoor and Quazi Khabeer, (2013) the accreditation does not replace the system of degree and diploma awards by the Universities. It provides quality assurance of the academic aims. The ICT is the need of the hour for quality assurance in higher education as it fastens the process of assessment and audit with greater transparency (Shaikh Faheem Gafoor and Quazi Khabeer, 2013).

Further, ICT-rich higher education institution gives a competitive advantage in recruiting students. ICT are used extensively for supporting powerful, efficient management and administration in educational administration (Christiana Maki, 2008; Ben-Zion Barta et. al., 1995). Sharad Sinha (2008) predicts diversified challenges for Indian education system in 21st century. According to Hossein Zainally (2008), ICT offers several facilities for administrators in education system to handle the given tasks with responsibility. Ashish Kumar and Arun Kumar (2005) highlight that in recent time the ICT is used as a techno-management tool to provide the benefit to Indian higher education institutions. According to Gumala Suri (2005) the universities are increasingly changing with the development of new ICT. Due to application of new ICT in University there is a significant shift in higher education (Krishnaveni and Meenakumari, 2010). However, data based research records are lacking on this aspect.

ICT accelerates the information and knowledge dissemination to become integrated into global networks. As per Ashish Kumar and Arun Kumar (2005) the ICT use in education there is a positive perception. The introduction of ICT based KM technologies are virtually recent practices but it is deprived of a holistic perspectives (Galliers and Baets 1998). Although diversified resource-and client-specific ICT based KM technologies (Omona et al. 2010) have been developed for integrating in higher education KM, but there exists a yawning gap between its advancement and need-based adoptions due to various bio-physical and socio-economic limiting factors need to be addressed.

Shaikh and Khoja, (2011) determine various issues and challenges while integrating ICT in higher education system and examines its coping mechanisms with the challenges of implementing ICT. In ICT-based knowledge society it is essential to have skilled workers, government support with sound ICT infrastructure to use ICT efficiently (Czerniewicz et al., 2005; Alev et al., 2009; Chowdhury, and Alam, 2009). Shaheeda et al. (2007), Jayson (2008), Shaikh (2009) and Yusuf and Afolabi, (2010) have reported that ICT helps in higher education systems to produce own knowledge societies for improving learning quality with better educational outcome. Several researchers (Khan, and Shah, 2004; Hameed, 2006; Amjad, 2006; Shaikh, 2009; Iqbal, and Ahmed, 2010) have pointed out that for achieving success in education, employment and everyday life, this century needs efficient ICT use in every field with confidence. Many researchers (Chung, 2001; Derek, and Dahlman, 2005; Ng et al., 2006; Teo,

2009) claim that world economies become more competitive and interdependent due to integration of ICT. In many studies (Ng et al., 2006; Gillard et al., 2008; UNESCO, 2008; Shaikh, 2009; Balasubramanian et al., 2009; Vajargah and Jahani, 2010; Erkunt, 2010), the investigators have pointed out that in addressing the challenges of ICT integration in KM the policy makers and teachers have crucial role to play. The effective use of social software in higher education has shown growing interest (Minocha, 2009) in adopting virtual learning environments (VLEs) incorporating wikis, blogs, forums and chat. Currently, the Face book, Google, Docs, Delicious, Flicker etc. are also used in higher education.

There are over 1346 and 1244 engineering colleges and polytechnics respectively which have been approved by All India Council of Technical Education (AICTE) as stated by Krishna (2007). Further, many more are establishing with the times. For getting approval by AICTE the existence of ICT infrastructure engineering colleges is prerequisite. These institutions are very important technology park management (Krishna, 2007). ICT professionals act as broker for knowledge of the institutes (Pawlowski and Robey, 2004) while, users of the ICT are considered as actors in adapting and adopting knowledge systems **(**Lamb and Kling, 2003). Firm-level knowledge integration researches are people inseparability in knowledge integration processes (Leonard-Barton 1995; Nahapiet and Ghosal 1998), role and limitations of technology (Argote and Ingram 2000; Stokes and Clegg 2002) and impact of firm level integration capacity (Kogut and Zander 1993; Nonaka and Takeuchi 1995). According to Leonardi (2007) the way of knowledge creation, modification, transmission and storing are performed with ICT.

Omona et al. (2010) report conceptual framework of ICT use to enhance KM in higher education. According to Yeh (2005) and Omona et al. (2010) ICT adoption in KM need to create new knowledge technologies processes to promote effective KM in higher education. For effective KM, institutions required to maintain efficient KM framework. Allee (1997) points out that the KM framework includes integration of organizational knowledge, information and technology infrastructure and store experiences. Von Krogh et al (2001) have suggested that persons may successfully achieve the goals of higher education in learning organization (Mellander, 2001) using effective KM procedures. As per Baskerville and Dulipovici (2006),

pre-existing theories understanding of need based KM is important for effective use of ICT in higher education.

Choenni et al. (2005) approach cognitive and community approach of KM. In cognitive approach of KM capturing, analyzing, developing, creating, organizing and sharing knowledge using ICT tools are the main characteristics. In community approach, effective communication, social interaction and collaboration are focused in KM. Hansen, et al. (1999) have expressed that the codification KM deals with computer and ICT capture, store, disseminate and reuse the knowledge. The evidence confirms that higher education by and large is an industry. It leads towards substantial impact on e-based national knowledge economy as well as effective to GDP (Kelly, McLellan, and McNicoll, 2009).

Conclusion

Above review indicated various roles, advantages and issues of ICT and KM in higher education. ICT is various technological sets which are used to communicate, create, disseminate, store and manage information. It is the current need for quality assurance in higher education. The significant challenges in higher education have emerged due to developing change in ICT with time. ICT facilitates teaching, research, and lifelong learning for higher education. In India the higher education system provides learning to learners at their choice of speed and learning place using ICT tools. ICT have significance in quality higher education, rapid development, employment generation, effective administration, livelihood improvement, community engagement and effective research global economy. Education is prerequisite for the socio-economic development. In digital age of today universities must produce adequate numbers of digital students equipped with recent knowledge, and skills to meet competitive market needs for global economy. ICT play a significant role in knowledge capturing, analyzing, developing, creating, organizing and sharing for social interaction, communication and collaboration. It is essential to develop accessible and affordable education for everyone utilizing ICT. Production of technology-ready workers is essential for knowledge-based economy. Governments and business communities are pressurizing universities or using ICT in routine tasks regularly.

Comprehensive investigation to create database regarding ICT in KM in the perceptions of teachers and learners for the Indian Universities and Institutions are required in order to develop need based efficient models for improving the teaching and learning in higher education at global level. It may enhance the understanding of practices and perceptional efficiency of ICT mediated KM in higher education. In order to mitigate relevant issues recommendations are to be made useful to policy makers, planners, higher education institutions, researchers, teachers, scholars and students in more than one ways in improving higher education to strengthen knowledge based national economy. However, data base creation is prerequisite from diversified educational institutes as well as from teachers and learners for further improvement in knowledge-base National economy. Currently the ICT in KM is on the threshold of digital era. There is an urgent need of the new conceptual research approach to address emerging challenges involving stakeholders, faculty, administration, trainers, and students. However, existence of an appropriate ICT infrastructure in universities is prerequisite to provide support for continuous update of the professional efficiency of teachers to cope with the challenges for development in ICT and KM.

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