ICT-based Teaching and Learning in Higher Education – A Study

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***Abstract*:** Technology has become an indispensable tool in all aspects of life. It has transformed our life in many ways including the teaching-learning pattern. At present there is a transformation from traditional learning to a flexible learning scenario. Technology enhances ones learning by eliminating the geographical barriers, time and space constraints thereby enhancing life-long learning. In specific Information and Communication Technologies (ICT) have brought about significant changes in the higher education sector. ICT has been used in various aspects of teaching learning process in higher education. This paper presents the purpose of ICT-based teaching-learning in higher education institutions. It also identifies and presents the various items that contribute to effective ICT-based teaching-learning process. This paper brings out the extent to which the identified items contribute to ICT-based teaching-learning process in the present scenario. A path model for teaching-learning process was built and estimated. The path model was found fit to be implemented in higher education institutions to increase ICT-based teaching-learning process.

***Keywords*:** Traditional learning, Transformation, Information and Communication Technology (ICT), Flexible learning, Path Model

1. Introduction

Knowledge has become the key factor in economic development. Knowledge revolution has also given rise to increased rate of innovations and a shorter product lifecycle. The advent of new economy based on advanced technologies and globalization combined with factors such as radical changes in the knowledge requirements and competition have enhanced the pressure on acquiring generic skills by all individuals in the current era.

Learning on a continued basis is required to bridge the skill gap between the requirements and competence of the individuals. Across the globe, information and communications technologies (ICTs) are changing the face of education. Our world is changing, and information and Communication technology (ICT) is central to this change Kader Asmal (2003). ICT and higher education changes are happening for improvement, innovation and for transformation. It has penetrated to all the aspects to learning and teaching process. The impact of ICT on traditional educational theories and practices are increasingly apparent. It has transformed and expanded the conventional boundaries of education. New innovations such as virtual colleges, laboratories, and universities are creating an abundance of additional areas of study surrounding this innovation.

A Technology–based learning systems unlike the traditional learning environment, is not bound by rigid timeframes, and location, and the learning experience is life-long. Rapid telecommunication and technological growth has paved the way for web-based education systems. We are in the transition period from a traditional to web-based learning system. Web-based education systems constitute one of the fastest growing areas in educational Technology, research and development. The mantra of web-based education system is “any time education anywhere” and “learning on the web rather than learning about the web”.

2. Objective of the Study

The Objective of this study is to determine various factors that contribute towards ICT-based teaching-learning processes. The extent of usage of technology for teaching-learning process in present higher education system and to identify the areas into which Technology is used to a larger extent in teaching -learning environment and to highlight the areas in which it could be used in an effective manner by proposing a validated model.

3. Theoretical Background

Education in India has evolved over the ages and continues to evolve, as witnessed from the progress of education right from ancient Indian times through the medieval period and pre-independence. Higher education in India gained momentum slowly and some of the ancient universities include Taxila, Vikramshila and Nalanda. Presently, India has hundreds of universities and thousands of colleges affiliated to them. A multitude of colleges have facility to focus on multiple disciplines. This has led to enhancement of the spread and quality of education in India. According to Whitworth and Berson (2003), ICT-enabled education has the potential to promote the development of students' decision-making and problem solving skills, data processing skills, and communication capabilities. ICT plays a major role for dealing with information and its transformation into knowledge, which is a basic requirement for citizens to become effective participants in this new scenario (Venezky, R.L. and C. Davis 2002).

ICT changes education from institution-centric to learner-centric, from classroom-based to being pervasively connected through e-learning and wireless technologies. New

classes of learners are created, namely those who are not able to come to campus, or cannot afford a fixed timeframe, or those who would want to have a tailored program for their specific needs. ICT allows us to have the flexibility in space, time, and content.

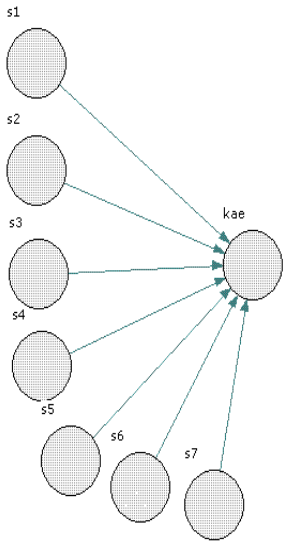
Learning using electronic means involves the acquisition of knowledge and skill using electronic technologies such as computer-and Internet-based courseware and local and wide area networks, and this is called e-learning (Encarta Dictionary, 2009). The use of technology in education, commonly defined as e-learning, has become a standard component in many courses. Technology applications are not limited to the classroom, and they are also replacing some classroom sessions with virtual sessions or fully replacing classroom courses with online courses (Paul Arabasz et.al. 2003).

The continuous innovation in ICT is causing an industrial and societal evolution based on information acquisition and knowledge dissemination (Branscomb, 1994), information networks represent the vehicles through which information and knowledge are being acquired and disseminated. Literature attests the power ICT can have in teaching and learning processes (Fonkoua, 2006; Newhouse, 2002). It has been suggested that using technology well in classrooms can even prepare students to be more effective citizens (John &Sutherland, 2004). In general, ICT can be considered as a vital tool to generate opportunities for attention to the increasing demand for higher education, as well as for improvement of academic processes and coordination of those with the society (Proyecto Académico 2007).

Further Demarest (1997), and Davenport et al., (1998), based on previous studies concluded that the process of knowledge management and the use of information technology can lower the cost of information usage and increase the speed of knowledge flow . From the above literature review, it is evident that ICT is playing a vital role in knowledge acquisition and there are lots of benefits of introducing ICT in the knowledge process. ICT is applied very effectively into a range of teaching strategies, including some very good interactive teaching involving questioning and discussion. ICT played an important role in helping teachers to demonstrate and reinforce key ideas during lessons using 'electronic blackboard', and e-mail was used efficiently to support homework (Douglas Osler 2000).Walter Omana and Theo Van der Wieda (2009) have clearly mentioned in their framework that knowledge capture/acquisition, knowledge store, knowledge share, knowledge enhancement, and knowledge dissemination can all be enhanced by technology and good policies.

4. Model building

Based on the above discussion, ICT is used as a tool for teaching and learning in higher education. The following path model for ICT-based teaching-learning process in higher education institutions with the various indicators was arrived at, as depicted below (Figure 1):



S1 - Usage of internet to supplement book information
S2 - Usage of ICT –based communication among faculties and students
S3 - Using Power Point Slides for teaching
S4- Evaluation of Test, Assignments and publication of results done electronically
S5- Expert interaction through ICT -based technology
S6 - Existence and extent of usage of Virtual library and Virtual leaning (e-learning)
S7- Usage of computers for multimedia-based delivery

Figure 1. Theoretical model for ICT-based teaching-learning process in higher education institutions

5. Methodology

This study is descriptive in nature with the population being approved higher education institutions. The sampling frame consists of 166 institutions and the sample size includes 50% of the total population. Random sampling technique was used for selecting the institutions. The instrument was validated for the items, and reliability and content validity test were also done. Further the theoretical model was validated using PLS.

6. Analysis

The following table depicts the important ICT factors that contribute to teaching-learning process in higher education institutions.

Table 1. Item categories generated for Teaching-learning Process

Process	ICT factors
ICT-based Teaching-Learning process	Internet browsing to supplement book information
	Going through specialized papers / slides of various authors on the Internet
	Access to discussion boards / forums on the Web
	Usage of e-mails to interact with other professors / experts to enhance knowledge
	Usage of Technology for research work
	Existence of Virtual library
	Existence of Virtual learning (e-learning)

The path model depicted in Figure 1 shows the significance of relationships between the constructs. An analysis was done to study the relationship between the factors and their impact on teaching learning process.

7. Findings and Discussion

It has been found from the literature review that ICT plays a major role in education and especially in teaching-learning process. The following were arrived at based on further analysis.

- The various items that contribute to ICT-based teaching-learning process are identified and depicted in Table 1
- Teaching-learning process has the average mean value of 3.72 which clearly indicates a good coverage of the various factors contributing to it.
- The demographic factors taken into consideration include the type of the institution, place and years of existence of the institution, the type of university to which they are affiliated, and the department and experience of the respondents. The demographic analysis did not reveal any statistically significant difference among the factors contributing to teaching-learning process

The contribution of individual items related to ICT-based Teaching-Learning process is represented in Table 2.

Table 2. Current contribution of items for ICT-based teaching-learning process

Knowledge Acquisition and Enhancement	Contribution %
Usage of Internet to supplement book information	96.5%
Usage of ICT-based communication among faculties and students	69.2%
Usage of Power Point Slides for delivery of lectures	89.5%
Evaluation of Test, Assignments and publication of results done electronically	55.6%
Usage of Technology for research work and for expert discussions	84.9%
Existence and extent of usage of Virtual library and Virtual learning (e-learning)	62.2%
Usage of computers for multimedia-based delivery	76.7%

It is evident from the above data that both teachers and learners use ICT-based tools for teaching-learning process. There is a lifelong thirst for learning and knowledge enhancement and ICT acts as a facilitating tool for it. The data in the above table (Table 2) reveals that learners use ICT-based tools to the highest for supplementing book information and in their research work. Teachers use ICT – based tools for delivering lectures. ICT can be used to enhance the existing knowledge through expert interactions and through discussion board and forums. There is a transition from traditional learning system to e-learning system in the higher education scenario. The analysis reveals that there is much scope in the area of developing virtual libraries in higher education institutions. Traditional library systems are still in existence to a large extent though computers are used for managing the day-to-day transactions of the library system. This study further reveals that application of ICT-based tools in the area of examination and evaluation needs improvement.

The theoretical model represented in Figure 1 was estimated and evaluated using Partial Least Squares technique to arrive at the path model. The model fit was ensured with the statistically significant values of R-squared (61.3%) for ICT-based teaching-learning process. It was observed that there was a good correlation between the various indicators towards ICT-based Teaching Learning process. The outcome is depicted in Figure 2:

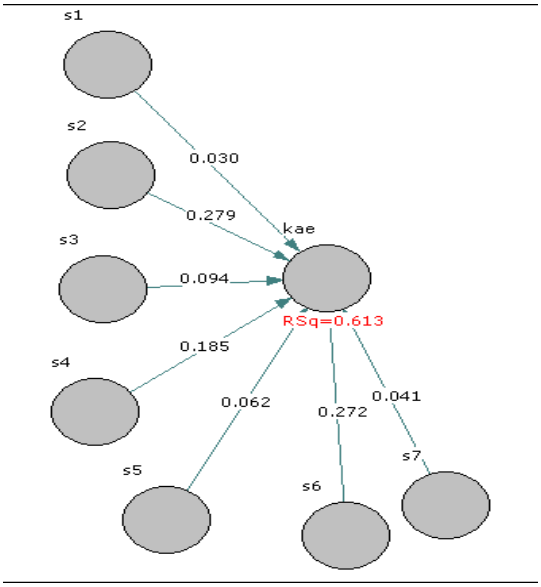


Figure 2. PLS Path model for ICT-based teaching-learning process in higher education institutions

8. Conclusion

At present Technology has become an indispensible tool for education. It is mainly intended to improve education access, so as to provide education for all. The outcome of this study could serve as an input for education planners to consider better utilization of ICT in various aspects relating to teaching-learning activities.

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