Application of ICT in Higher Education

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Abstract
Higher education in India has made considerable progress in last few decades. Similarly, development in technology brings the terms like e-learning or use of information and communication technology (ICT) in higher education which makes a tremendous change in the education system. It allows learners to study anywhere and at anytime, with effective learning to unlimited number of students. The use of ICT in education itself tends to more student centered learning settings and often this creates a little tension for some teachers and students. However, world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important and this importance will continue to grow. This review article highlights impacts of ICT on contemporary higher education.

Keywords: ICT, Higher education, teaching and learning

Introduction
India has one of the largest higher education systems in the world consisting more than 700 universities according to UGC as on 2016. Besides there are thousands of colleges of higher learning in the country, the number of students enrolled in the universities and colleges has increased since independence, however, this growth does not reveal much improvement in the delivery of higher education in the country.

The higher education system in India is not remarkable due to inadequate access to technology and inequity. However, the application of ICT in higher education has not only brought about diversification in higher education but has also fostered new avenues for international mobility of traditional and non-traditional students (Pegu, 2014). While it is believed that ICT can transform the educational picture in the country, it should tackle the needs and perform multiple roles in higher education. This sense of urgency and also the continuous implementation of ICT in educational activity have led many universities and colleges into a lot of action-oriented adaptation approach (Schmittlein & Taylor, 2000).
ICTs have a significant impact on educational practice up to date and it is growing considerably in years to come and eventually it will become a strong agent for change among many educational practices. Extrapolating current practices and activities, the consistent use and development of ICT in education will have a strong impact on what and how it is learned; When and where learning takes place (Bala, 2018; Sambyal & Gupta).

What is ICT

Information and Communication Technology (ICT) is referred to the variety of collective technological resources which are useful to communicate. They are also useful in generation, distribution, collection and administration of information. ICT is a logical force that has changed several aspects of the way we live. It consist of the hardware, software, networks, and media for collection, storage, processing, transmission and presentation of information (voice, data, text, images), as well as related services. ICTs can be divided into two components. Information and Communication Infrastructure which refers to physical telecommunications systems and network (cellular, broadcast, cable, satellite, postal), also the services that utilize those (Internet, voice, mail, radio, and television), and Information Technology (IT) that refers to the hardware and software of information collection, storage, processing, and presentation (Sarkar, 2012; Thakare).

Use of ICT in teaching and learning process

ICT has been well tested and used in developed countries to tackle most of these problems associated with teaching and learning process. It can be used in the Indian educational system to teach all subjects like Science, Mathematics including engineering (Kabouridis, 2010). ICT can improve teaching by enhancing an already accomplished knowledge and introducing new ways of teaching and learning process. Transforming teaching is more difficult to achieve. “The changes that take full benefit of ICT will only happen gradually over time, and as long as teachers continue to experiment with new approaches.” (Underwood, et al., 2006).

Use of ICT in higher education

Introduction of use of ICT in the higher education has generated to knowledge creation i.e. field of research and its dissemination and on the other extreme it is feared that there use will further the digital inequity. It is anticipated that their increasing use in education system will also raise issues regarding what kind of technologies, in what quantity, at what level and for what purpose they need to be introduced. The concerns such as who will manage this process develop policy guidelines and strategies also require consideration. Wright (Wright, 2000) pointed out that it will not be wise to ignore the issues related to equity, cultural integrity, and the negative aspects of technology in economic and social development. Nevertheless, the opportunities and challenges raised at different platforms can be categorized as the aspects relating to role of ICT for access and equity in education, role in management
and efficiency in education, their role in pedagogy for quality learning and teaching at higher education level and in inducing innovations in approaches and programs (Snehi, 2009).

Use of ICT in research

The steady increases in computing power available have made it possible to conduct complex calculations on large data sets. Communication links make it possible for research teams to be spread across the world instead of concentrated in a single organization. The combination of communications and digital libraries is equalizing access to academic resources, greatly enriching research potential for smaller or remote institutions. Taking full advantage of this trend to form new dynamics in research requires some national policies based on ICTs in higher education and the establishment of joint information systems connecting all higher education institutions.

The application of ICTs in academic research has grown steadily in the past 15 years in both developing and developed countries. The most important use of ICTs in research is in data processing. The unique growth in bandwidth and computing power provide opportunities for analyzing or processing large amount of data and performing complex calculations those are extremely fast, accurate and reliable. Computer data processing not only free researchers from the burdensome task of manually analyzing data but more importantly facilitates quick and accurate analysis of huge amounts of data from national samples or even multi-national samples covering number of respondents. Another important dimension of ICTs in research is the use of online full text databases and online research libraries or virtual libraries which are the direct outcome of the growth in telecommunications networks and technology. These databases and libraries provide researchers the online access to the contents of thousands of books from major publishers, research reports, and peer-reviewed articles in electric journals (Sarkar, 2012).

Benefits of ICT in higher education

ICT enhances higher education in a number of ways with following advantages.

i. Eliminating time barriers in education for learners as well as teachers and geographical barriers for learners to study from anywhere.

ii. It enables the effective storing/sorting of information, and can offer new fast ways of communication;

iii. It enables the reduction of information quantity towards a higher quality and better structure;

iv. It can be integrated into teaching and learning strategies – and used to support relative learning theories; and

v. It can be used to create new types of interactive learning media (computers, Inter and Intranet) for improved quality, equity, and access in higher education (Thomas, 1999).

Challenges of the implementation of ICT

ICTs are powerful tools having potential to transform the educational systems and opportunities for all students including those who are normally excluded by virtue of their special circumstances and special educational needs. Use of ICTs can break down some of the barriers that lead to underachievement, student disaffection and educational exclusion (Swarts, 2006). However, when one looks around, in
most of the colleges and universities across the country lack of tackling of this potential is visible. In spite of the fact that planning and implementation of initiatives for enhancing role of technology in education have received priority, analysis of the existing scenario reveals number of factors which have been impeding the integration of ICTs in educational sector (Snehi, 2009). There are several barriers in implementation of ICT in developing countries (Khan, Hossain, Hasan, & Clement, 2012).

1. ICT Supported Infrastructure and Lack of Resources

The development of the ICT infrastructure in a country is depending on the availability of a consistent electricity supply. Moreover, for implementation of ICT demands other resources, such as computers, printers, multimedia projectors, scanners, etc. which are not available in all the educational institutions are also important. Besides, ICT requires up-to-date hardware and software. Using up-to-date hardware and software resources is a key feature in the diffusion of technology (Gülbahar, 2007), but a rare experience in educational institutions. High-speed internet connection is another requirement for integrating ICT into the teaching-learning situation. But unfortunately as shown in table 1 (Worldwide broadband speed league 2018) internet access is poor in some countries (Abdullah & Gulzar, 2016).

<table>
<thead>
<tr>
<th>Country</th>
<th>Broadband speed Mbps</th>
<th>Internet Users (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>60.39</td>
<td>81.00</td>
</tr>
<tr>
<td>Japan</td>
<td>28.94</td>
<td>92.00</td>
</tr>
<tr>
<td>Taiwan</td>
<td>28.09</td>
<td>79.75</td>
</tr>
<tr>
<td>United States</td>
<td>25.86</td>
<td>76.18</td>
</tr>
<tr>
<td>Russia</td>
<td>13.51</td>
<td>76.41</td>
</tr>
<tr>
<td>China</td>
<td>7.60</td>
<td>53.20</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>5.84</td>
<td>32.05</td>
</tr>
<tr>
<td>India</td>
<td>5.19</td>
<td>53.35</td>
</tr>
<tr>
<td>Nepal</td>
<td>2.36</td>
<td>19.69</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1.97</td>
<td>65.53</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1.32</td>
<td>30.16</td>
</tr>
</tbody>
</table>

2. Insufficient Funds

ICT supported hardware, software, audio visual aids, teaching aids and other accessories demand huge funds (In, 2016). The lack of funds to get the required hardware and software package is one of the reasons that teachers do not use technology in their classes. Efficient and effective use of technology depends on the availability of hardware and software and the equity of access to resources by teachers, students an administrative staff (Afshari, Bakar, Luan, Samah, & Fooi, 2009). These costs are inflated in most cases and cannot be provided by most developing countries.

3. Time and effort constraints

Teachers are normally busy with their daily schedule of lecture sessions, maintaining records, question paper setting, answer sheet correction, interacting with students, conducting seminars, quiz sessions, discussion forums, assignment checking etc. The basic Challenge is that they have to learn the pattern of the operating process initially, then prepare the course content according to the instructions and the
various assessment documentations as per the formats compatible to the ICT tool within the available time frame (Mayer, Dumont, Istance, & Benavides, 2010).

4. Teachers' Attitudes about ICT

Teachers’ attitudes are found to be major predictors of the employment of latest technologies in instructional settings (Almusalam, 2001). The successful use of ICT into classroom mostly depends on teachers’ attitudes and belief relating to these. It is found that less technically skilled teachers, who possess positive attitudes towards ICT, require less effort and encouragement to learn the skills required for the implementation of ICT in their design activities into the classroom (Khan, et al., 2012). Similarly, Participants with negative computer attitudes were less skilled in computer use and were therefore less likely to accept and adapt to technology than those with positive attitudes (Harrison & Rainer Jr, 1992).

Although it has numerous advantages reported in literature over traditional learning there are some limitations too. Initially this requires teachers to become more familiar with ICT and which will reduce the interaction with students. Further, those students are more familiar with ICT will get more benefit to learn than who is less which ultimately shifts the driving force of studying core to developing ICT skill. It comparatively more expensive, it may create lack of communication between student and teacher and can reduce the desire of learning in students.

Conclusion

It is believed that the use of ICT in higher education can increase access to learning opportunities. It can help to develop the quality of education with advanced teaching methods, improve learning outcomes and enable reform or improved management of education systems. Availability of course material in education can be shared by means of ICT, can promote better teaching. Moreover, this will increase flexibility so that learners can access the education regardless of time and geographical barriers. Apart from implementation of ICT in higher education, governments and higher education institutions will need to develop strategies for effective ICT deployment and sustainability.
References:

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